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WHC-SD-EN-AP-153
Revision 1

9413276.1752

Installation of Groundwater Monitoring Wells in Support of the 100-K Area Fuel Storage Basins

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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Page 1 of 2

1. ECN	186784
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2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [ ] Direct Revision [x] Change ECN [ ] Temporary [ ] Standby [ ] Supersedure [ ] Cancel/Void [ ]	B.A. Williams, 86950, H6-06, 6-3416		4/21/94
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	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-EN-AP-153, Rev. 0	**9. Related ECN No(s).** NA	**10. Related PO No.** NA

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
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12. Description of Change

This plan is being revised to include justification and characterization criteria for three phase II groundwater monitoring wells to be installed near the K-East basins.

Hydrologic characterization and groundwater monitoring of K-Basins nuclear fuel storage activities is required to support TPA milestone M-34-00, T-03.

Title Change.

13a. Justification (mark one)			
	Criteria Change [ ]	Design Improvement [ ]	Environmental [ ]
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13b. Justification Details

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Tank Waste Remediation System			
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List attachments.

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RECORD OF REVISION

RECORD OF REVISION	(1) Document Number WHC-SD-EN-AP-153	Page 1 of 1

(2) Title
Installation of Groundwater Monitoring Wells in Support of the 100-K Area Fuel Storage Basins

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
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1.0 INTRODUCTION

This revised well installation plan describes a program to enhance groundwater monitoring capabilities around the 100-K Area Fuel Storage Basins. The initial plan provided background information on groundwater monitoring in the 100-K Area and described the installation of three new wells at the K-West Basin. These wells provide sampling access to groundwater at the water table. The installation of three additional new wells near the K-East Basin are being added to the plan by this revision. Other minor changes have been made to the plan to shift its focus from K-West Basin to both K-West and K-East Basins.

The six new wells, along with existing wells in the 100-K Area, form a network that is used to detect impacts on groundwater due to basin operations. The well network and its sampling/analysis program are conducted as part of operational monitoring activities (DOE-RL 1991, Section II.B). The program is designed to be consistent with the intent of 40 CFR 265, Subpart F, Interim Status Standards for Hazardous Waste Treatment, Storage, and Disposal Facilities.

1.1 OBJECTIVES

Three newly constructed groundwater monitoring wells near the K-West Basin and three proposed wells near the K-East Basin share several common objectives that relate to current and future use of the fuel storage basins:

- Determine the stratigraphy, hydrologic units, aquifer properties, and presence or absence of contamination for the drilled interval, which includes both unsaturated and saturated sediments;
- Establish a hydrostratigraphic framework for contaminant transport modeling;
- Monitor chemical and radiological characteristics in the groundwater flow regime that might be influenced by potential leakage from either fuel storage basin; and
- Provide access for *in situ* measurement of groundwater quality, water levels, and flow velocity and direction.

The information generated by meeting these objectives contributes to a feasibility study associated with the future use of the fuel storage basins. The feasibility study is a part of *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989) Milestone M-34-00, T-03, which is due in September 1994.

1.2 OVERVIEW OF 100-K AREA MONITORING PROGRAMS

Groundwater has been monitored in the 100-K Area under several programs. These include monitoring during the period that the reactors were operating, to the present period of limited operations involving the fuel storage basins and environmental restoration activities. The various programs are Operational Monitoring, Environmental Restoration, and Sitewide Environmental Surveillance. Additional oversight sampling is conducted by the Washington State Department of Health (DOH).

1.2.1 Operational Monitoring Program

For several years groundwater quality associated with the fuel storage basins and a liquid waste disposal trench has been monitored quarterly under the Operational Monitoring Program (DOE-RL 1991, Section II.B; DOE 1988). During March 1993, monitoring near the K-East Basin was substantially enhanced, in response to indications of increased water loss from the basin.

Sampling and analysis under this program are conducted by Westinghouse Hanford Company (WHC) via a statement-of-work to Pacific Northwest Laboratory (PNL). Field and laboratory protocols are consistent with Resource Conservation and Recovery Act (RCRA) requirements. This sampling and analysis program meets the data quality objectives outlined in WHC (1993b). The data are stored in the Hanford Environmental Information System (HEIS) and the Geosciences Data Analysis Toolkit (GeoDAT). Results are reported in annual operational monitoring program reports (e.g., Johnson 1993) and in separate reports for specific projects.

1.2.2 Environmental Restoration Program

Groundwater beneath the 100-K Area is included in the 100-KR-4 operable unit, a past-practices site regulated under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Remedial investigations to date have focused on liquid waste disposal facilities and the pathway from these facilities to the Columbia River. Seven new groundwater monitoring wells were installed during 1992 as part of this program. Six of these wells monitor water table conditions, while the seventh well monitors conditions within a semiconfined interval at the base of the uppermost unconfined hydrologic unit, to check for evidence of downward migration of contamination.

These new wells and several existing wells were sampled for four quarters during the last half of 1992 and first half of 1993. A comprehensive suite of analyses for Hanford Site waste indicator constituents was conducted. Contract Laboratory Program (CLP) protocol was followed for these analyses. The data are available from both HEIS and GeoDAT, and are summarized in a Limited Field Investigation Report (DOE-RL 1993).

The remedial investigation associated with the 100-KR-4 operable unit has reduced its sampling frequency to semiannual and abbreviated the analysis list. Future groundwater monitoring under this program will be associated with field remediation activities such as pump-and-treatment of contaminated groundwater or large-scale soil column remediation.

1.2.3 Sitewide Environmental Surveillance

The environmental surveillance specified by DOE orders is conducted by PNL (DOE-RL 1991, Section III.B; DOE 1988). The objectives are to monitor the potential effects of Hanford Site operations on environmental and natural resources, both on the Hanford Site and in surrounding areas. The sitewide scale of this monitoring program complements the facility-specific scale of monitoring conducted by WHC under the operational program.

The surveillance program focuses on Hanford Site waste indicator constituents that are common and widespread such as nitrate, tritium, and strontium-90. Samples are collected from wells distributed over broad areas (e.g., 100 Areas), typically on an annual or semiannual basis. The resulting data are available from HEIS and GeoDAT and are reported annually in groundwater monitoring reports (e.g., Dresel et al. 1993) and environmental reports (e.g., Woodruff and Hanf, 1993).

The DOH also conducts oversight sampling of Hanford Site groundwater. That sampling is coordinated with PNL's surveillance sampling, although separate laboratories are used for analyses. At 100-K Area, the DOH periodically samples well 199-K-27. The resulting data are available from the DOH; the data are not stored in HEIS or GeoDAT.

2.0 MONITORING WELL LOCATIONS

2.1 EXISTING MONITORING WELLS

Groundwater monitoring wells in the 100-K Area are shown in Figure 1. Most of the pre-1992 wells are constructed with carbon steel casings and perforated sampling intervals. These wells do not have an annular seal nor do they typically have surface protection. Wells drilled during 1992 were constructed to Washington Administrative Codes (WAC) (WAC-173-160) and also meet RCRA requirements (40 CFR 265, Subpart F). These wells have stainless steel casings, screen sampling intervals, full annular seals, and surface protection.

Construction characteristics of existing wells are summarized in Table 1 and well construction diagrams are provided in Appendix A.

2.2 PROPOSED MONITORING WELLS

Wells proposed to monitor 100-K Area Fuel Storage Basin operations are being installed in several phases (see Figure 1). The first phase includes three new wells near K-West Basin. The second phase will augment existing monitoring capability around the K-East Basin. Subsequent phases will be planned if information derived from the new wells proves insufficient to support the program objectives (Section 1.1). Information derived from all new and existing wells will support a conceptual and numerical model for contaminant transport via groundwater flow, thus enhancing the capability to predict future conditions caused by various leak scenarios.

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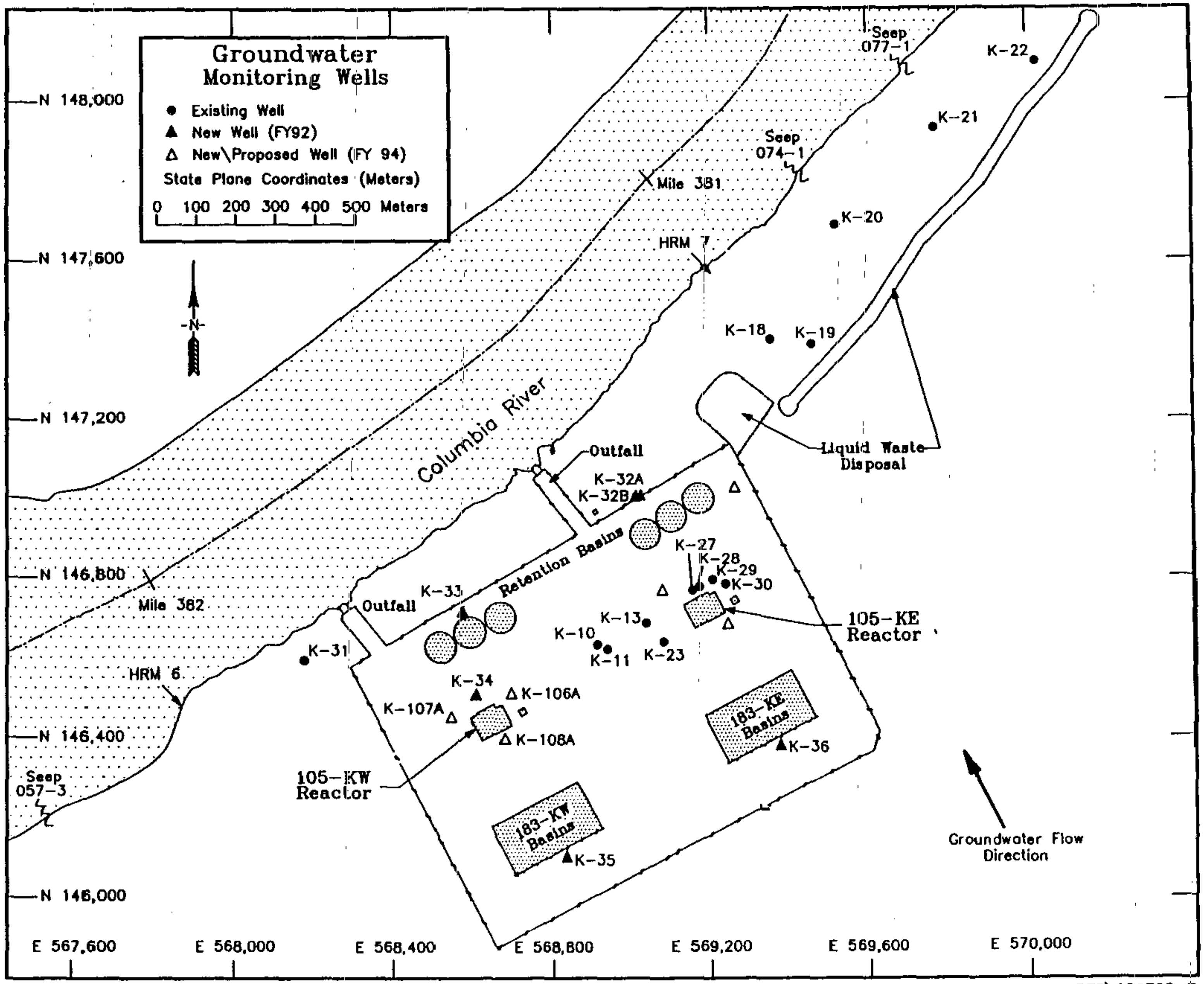

Figure 1. 100-K Area Monitoring Wells and Liquid Waste Disposal Facilities.

Table 1. Characteristics of Existing Wells at 100-K Area.

Well number	Completion date	Casing (dia)(in)	Sampling interval (below surface)[a]		Completed depth[a]	Total depth[a]	Pump intake[b]	Ground surface (ft)	Survey source	Top of casing[c]
199-K-10	08/31/52	12	155 - 165	P	160	171	no pump	466	KAIS 2/13/93	465.11
199-K-11	08/31/52	6	69 - 160	P	138	170	79.97	466	KAIS 2/13/93	466.55
199-K-13	03/31/53	12	63 - 134	P	134	159	no pump	462.7	USCOE 1993	465.60
199-K-18	10/30/54	8	18 - 39	P	40	60	38.24	407.7	USCOE 1993	409.95
199-K-19	04/30/55	8	10 - 50	S	51	51	44.31	420	USCOE 1993	422.09
199-K-20	05/31/55	8	10 - 50	P	48	50	42.81	421	USCOE 1993	421.94
199-K-21	05/31/55	8	10 - 50	P	16	50	42.79	420	KAIS 2/13/93	421.73
199-K-22	05/31/55	8	10 - 50	P	49	50	48.95	419	USCOE 1993	424.46
199-K-23	02/28/56	8	65 - 80	P	25	80	79.11	403	USCOE 1993	468.17
199-K-27	09/30/79	6	65 - 85	P	90	90	80.39	463	USCOE 1993	466.67
199-K-28	09/30/79	6	63 - 88	P	88	90	76.01	463	USCOE 1993	465.97
199-K-29	09/30/79	6	65 - 85	P	89	90	77.95	462	USCOE 1993	467.39
199-K-30	10/31/79	6	67 - 87	S	87	90	82.41	462	USCOE 1993	466.20
199-K-31	05/31/86	6	30 - 50	S	50	50	40.7	unknown	USCOE 1993	412.40
199-K-32A	08/13/92	4	45 - 65	S	65	69	64.73	440.99	KAIS 2/16/93	444.02
199-K-32B	08/25/92	4	158 - 168	S	168	176	144.06	442.19	KAIS 2/16/93	445.27
199-K-33	08/10/92	4	42 - 66	S	66	66	not avail	440.52	KAIS 2/16/93	443.64
199-K-34	08/20/92	4	67 - 87	S	87	91	85.82	464.85	KAIS 2/16/93	468.09
199-K-35	08/21/92	4	89 - 109	S	109	117	107.88	491.4	KAIS 2/16/93	494.55
199-K-36	08/24/92	4	89 - 109	S	109	113	107.99	491	KAIS 2/16/93	494.07
199-K-37	08/04/92	4	43 - 63	S	63	69	not avail	438.8	KAIS 2/16/93	441.80
699-70-68	07/06/54	8	126 - 145	P	145	149	132.22	524.4	USCOE 1993	526.07
699-72-73	09/21/61	8	60 - 135	P	135	200	99.11	480.7	USCOE 1993	482.59
699-73-61	09/17/62	8	107 - 146	P/S	146	150	143.59	529.8	USCOE 1993	531.43
699-78-62	05/16/57	8	70 - 106	P/S	106	152	83.05	468	USCOE 1993	469.69

[a]Depth below ground surface (ft)
[b]Depth below top of casing (ft)
[c]Top of casing (ft) (NGVD29)

P = perforated
S = screen

2.2.1 Phase I Wells

Three wells were installed under an expedited schedule. The urgency in completing these wells comes from the need for groundwater information to support a future use feasibility study for the K-West Basin. This feasibility study is part of Tri-Party Agreement Milestone M-34-00, which is due September 30, 1994 (Ecology et al. 1989).

Locations for Phase I wells are shown in Figure 2. Their order of installation was: (1) 199-K-106A, located near the northeast corner of K-West Basin and approximately equidistant from the basin and the 115-KW french drain, (2) 199-K-107A, located near the northwest corner of the basin and adjacent to the drainage collection system sump, and (3) 199-K-108A, located near the southeast corner of the 105-KW reactor building.

Data quality objectives common to all new wells installed to support the fuel storage basins program are described in Section 1.1. Additional objectives specific to each Phase I well include:

199-K-106A

- Provide a monitoring analog to well 199-K-30, which is near the K-East Basin and exhibits anomalously high tritium and carbon-14 concentrations
- Monitor groundwater conditions near the 115-KW french drain, a second potential source for tritium and only known source of carbon-14
- Search for evidence of downward migration of contamination, by drilling through the uppermost unconfined aquifer and into the first confining interval
- Complement existing downgradient monitoring well 199-K-34 to provide more complete coverage.

199-K-107A

- Monitor groundwater conditions near the basin drainage collection system sump ("D-sump")
- Complement existing downgradient monitoring well 199-K-34 to provide more complete coverage.

199-K-108A

- Provide an upgradient monitoring well to characterize water quality in the flow path not influenced by potential leakage from the basin or the 115-KW french drain.

COORDINATES: LAMBERT
CONTOUR INTERVAL: 0.5M
SCALE: SEE BELOW

DATE: DECEMBER 2, 1993

PROPOSED WELL LOCATION - ▲

NOTE** LOCATIONS HAVE NOT BEEN SURVEYED FOR SUBSURFACE OBSTACLES

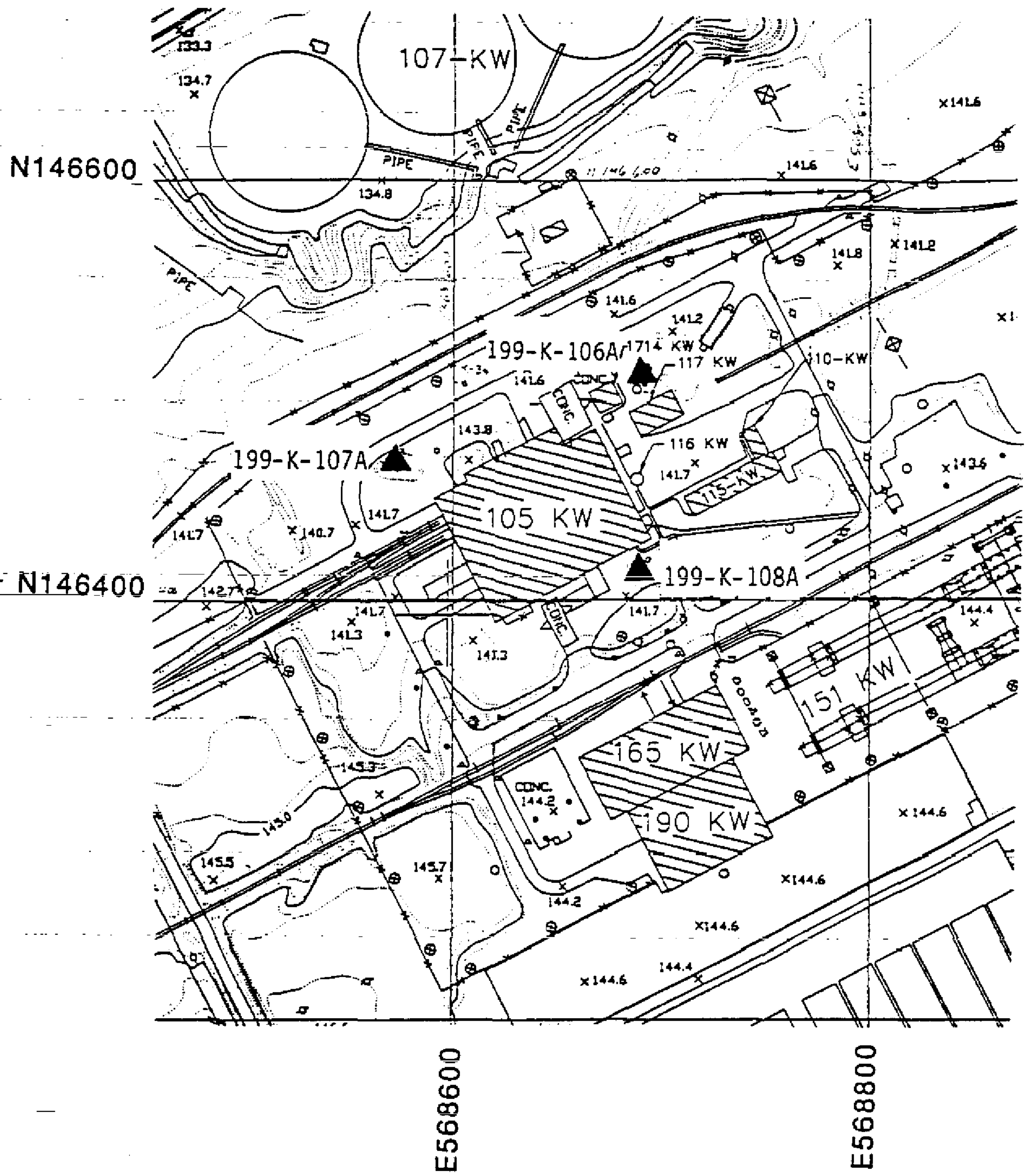

Figure 2. Phase I Well Locations at K-West Fuel Storage Basin.

When completed, this network of downgradient and upgradient monitoring wells will be capable of assessing the influence that K-West Basin operations might have on groundwater quality beneath the facility. The network will support the objectives of WAC-173-303 (Ecology 1988) and 40 CFR 265, Subpart F. The efficiency of the completed network to intercept a potential groundwater plume originating from the K-West Basin will be evaluated using the MEMO model (Wilson et al. 1992).

Final drilling locations for the wells were constrained somewhat by the need to avoid subsurface obstacles. Such obstacles near the basin include piping, utility conduits, and unmapped subsurface structures. Surface geophysical methods were used to locate these potential obstacles. The approximate coordinates (Washington State Plane, South Zone) for the drill sites are:

Well	North (m)	East (m)	Location Relative to 105-KW Building
199-K-106A	146,503	568,695	30 m east-northeast of northeast corner
199-K-107A	146,463	568,573	25 m northwest of northwest corner
199-K-108A	146,412	568,689	18 m south of southeast corner

2.2.2 Phase II Wells

Three additional groundwater monitoring wells are proposed near the K-East Basin during the second phase of drilling. They augment the existing capability to monitor groundwater conditions in the flow regime beneath the basin. These wells will improve the current conceptual model for groundwater flow in the area, and will provide better definition for the extent of contaminated groundwater.

The locations for Phase II wells are shown in Figure 3. The proposed order of installation is: (1) 199-K-111A, located mid-way between the basin and existing wells near the river, within the flow path downgradient of K-East Basin, (2) 199-K-109A, located near the northwest corner (downgradient) of the K-East Basin and adjacent to the drainage collection system sump, and (3) 199-K-110A, located near the southeast corner (upgradient) of the 105 K-East reactor building.

Data quality objectives common to all new wells being installed to support the fuel storage program are described in Section 1.1. Additional objectives specific to the Phase II wells are:

<u>199-K-109A</u>

- Monitor groundwater conditions near the basin drainage collection system
- Search for evidence of downward migration of contamination, by drilling through the uppermost unconfined aquifer and into the first confining interval
- Provide borehole access for determining shear wave velocities, to support seismic response engineering studies.

COORDINATES: STATE PLANE
CONTOUR INTERVAL:0.5M
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PROPOSED WELL LOCATION-▲

NOTE**LOCATIONS HAVE NOT BEEN SURVEYED FOR SUBSURFACE OBSTACLES

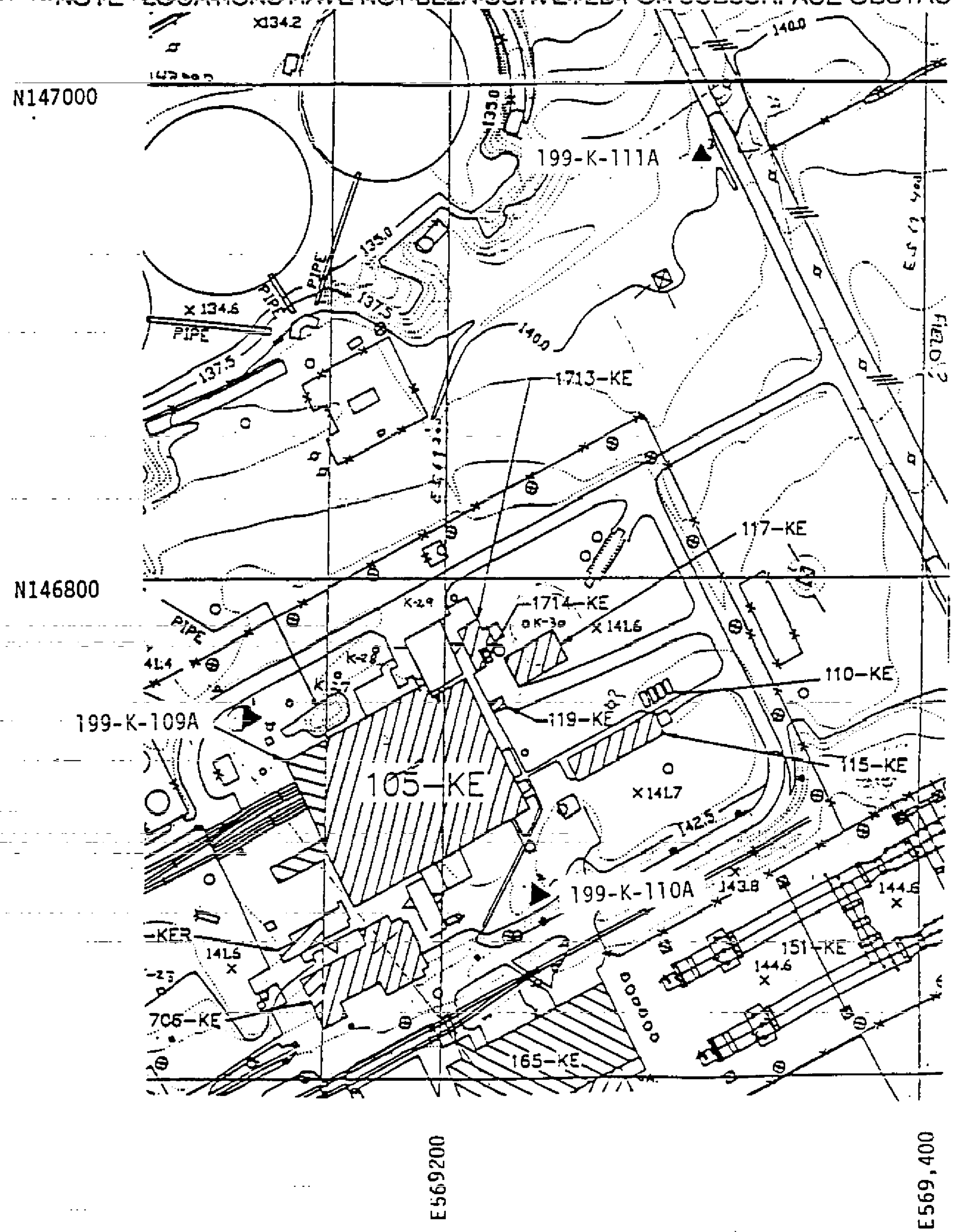

Figure 3. Phase II Well Locations Near K-East Fuel Storage Basin.

199-K-110A

- Provide an upgradient monitoring well to characterize water quality in the flow path not influenced by potential leakage from the K-East Basin or past disposal to the 115-KE french drain.

199-K-111A

- Provide an additional downgradient monitoring location that is mid-way between the basin and existing near-river monitoring wells, to act as a control point for plume identification and tracking.

These additional monitoring wells around the K-East Basin will enhance the current capability to detect significant leakage from the basin, as well as assess the impact potential leakage might have on groundwater quality. The network will support the objectives of WAC-173-303 (Ecology 1988) and 40 CFR 265, Subpart F. The efficiency of the completed network to intercept a groundwater plume originating from the K-East Basin will be evaluated using the MEMO model (Wilson et al. 1992).

A geophysical test will be conducted during the installation of well 199-K-109A to support seismic engineering studies. The existing structural analysis for the K-East Basin was completed in 1991 using soil physical properties from a site approximately 2.5 km (1.5 mi) from the K-East Basin. New data from 199-K-109A will be used to confirm or modify the results of the 1991 analysis. Special emphasis will be placed on characterizing seismic wave velocities (P- and S-waves) in the engineered fill and natural sediments that surround the K-East Basin. During drilling operations, measurements will be made using a geophone lowered the length of the temporary steel-cased hole, to a total depth of approximately 59 m (195 ft). The permanent casing will be a hybrid consisting of polyvinyl chloride (PVC) casing connected to a stainless steel screen. After completion, constant-azimuth recordings of seismic wave velocities will be made through the PVC casing.

Final drilling locations for the wells will be constrained somewhat by the need to avoid subsurface obstacles. Such obstacles near the basin include piping, utility conduits, and unmapped subsurface structures. Surface geophysical methods are used to locate these potential obstacles. The approximate coordinates (Washington State Plane, South Zone) for the drill sites are:

Well	North (m)	East (m)	Location Relative to 105-KE Building
199-K-109A	146,755	569,125	25 m northwest of the northwest corner
199-K-110A	146,675	569,245	30 m south of the southeast corner
199-K-111A	146,970	569,300	220 m north-northeast of the northeast corner

2.2.3 Phase III Wells

The need for additional monitoring wells will be evaluated after the results from Phase I and Phase II drilling are interpreted. This need will be predicated on the ability to (1) detect potential groundwater contamination from leakage at K-West and K-East Basins, (2) characterize the extent of contamination and its movement, and (3) predict contaminant transport for hypothetical leak scenarios using a numerical model.

3.0 WELL CONSTRUCTION

Westinghouse Hanford Company follows a generic specification for well design and construction materials (WHC 1993a). These specifications meet the requirements of WAC-173-160 (Ecology 1991), as well as U.S. Environmental Protection Agency (EPA) requirements for RCRA monitoring wells (EPA 1986 and 1992). Figure 4 is a schematic diagram for a monitoring well that would monitor groundwater conditions near the water table.

Drilling, well construction, aquifer testing, and associated activities will be conducted according to WHC Environmental Investigations Instructions (EII) (WHC 1988). WHC procedures for drilling, installation, and related activities are described in EII 6.7, "Documentation of Well Drilling and Completion Operations." Well construction details are specified on well construction data sheets. Supplemental procedures that provide more details to the EII's are found in WHC (1992a). Specific quality assurance requirements that apply to well construction are described in a quality assurance program plan (WHC 1992b) and in the Tri-Party Agreement (Ecology et al. 1989).

3.1 DRILLING OPERATIONS

A cable tool rig will be used for drilling. If it becomes necessary to use another method for logistical reasons, the method will have similar capabilities as the cable tool method. The required capabilities include: (1) drill cuttings are minimized and easily contained, (2) representative sediment samples from specific depths can be obtained, (3) sediment samples for moisture analysis can be obtained from the unsaturated zone above the water table, (4) disturbance to the borehole wall is minimized, (5) a straight, plumb borehole is produced, and (6) groundwater and surrounding sediment are not affected by drilling fluids other than water or air.

Drill rigs and peripheral equipment such as drill tools, cables, and temporary casing will be steam cleaned before arrival at the drill site and prior to moving to subsequent locations following EII 5.4, "Field Cleaning and/or Decontamination of Equipment." The addition of water to the borehole during drilling will be kept to a minimum. This reduces the amount of pumping needed to develop the well after construction is complete, and minimizes the potential for remobilizing contaminants potentially present in the sediments.

Temporary carbon steel casing having a minimum diameter of 8 in. will be driven to total depth as each borehole is advanced. The shallow water table wells will be drilled approximately 6 m (20 ft) into the saturated sediments. The total depth (TD) of these boreholes averages 29 m (95 ft). The boreholes drilled to ascertain downward migration of contamination will extend approximately 30 m (100 ft) beyond the proposed screen interval, and have a TD of 59 m (195 ft). They will be drilled into the fine-grained unit that forms the base of the uppermost hydrologic unit.

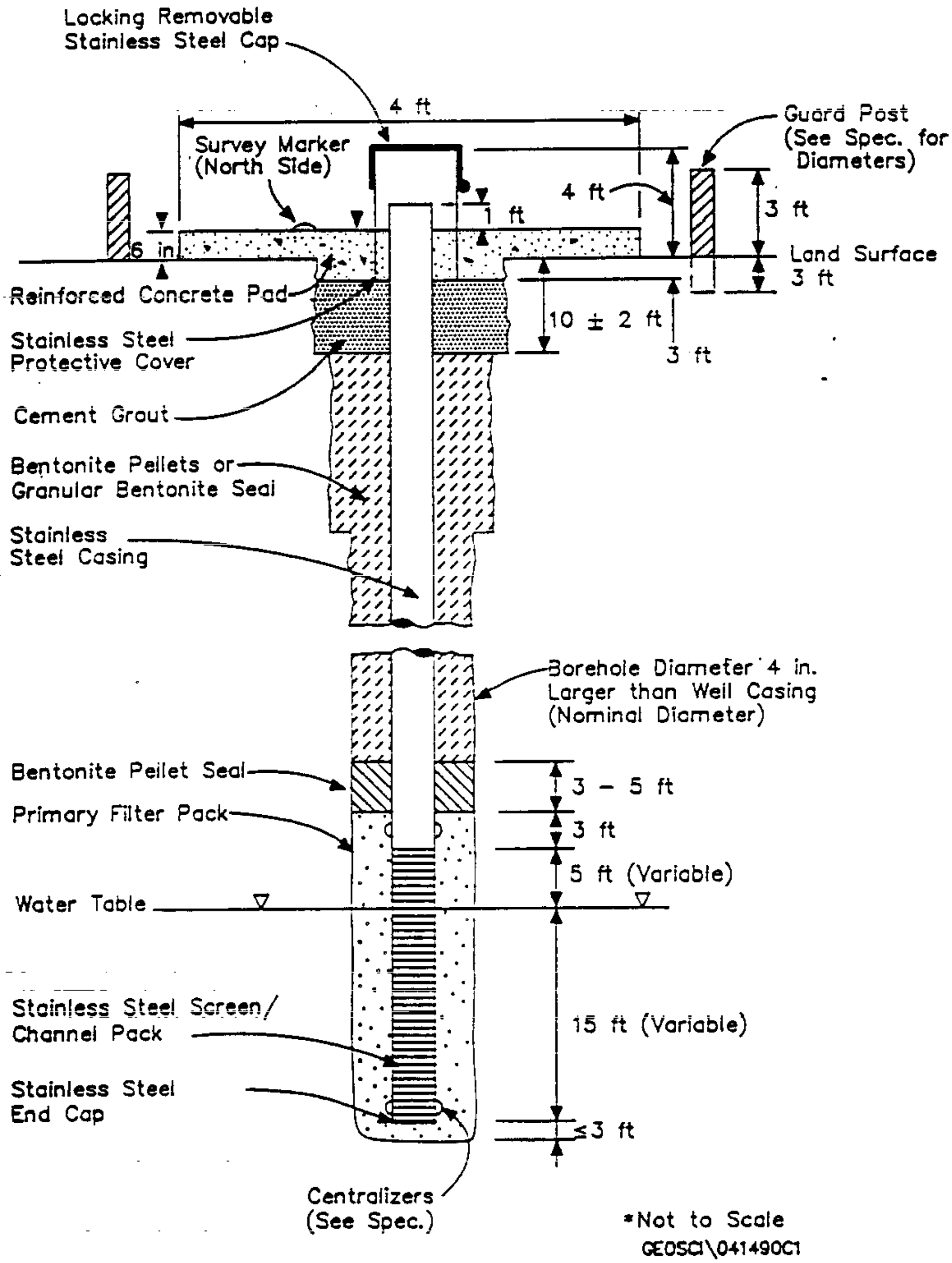

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Figure 4. Construction Schematic for a Shallow Groundwater Monitoring Well.

A temporary groundwater sampling device will be used to collect water samples at selected intervals, as determined by the well site geologist. These samples will be analyzed for hazardous waste indicators (see Section 4.5.3). Mineralogical analyses and physical tests will be conducted on samples from the basal fine-grained unit, assuming that intact, representative samples can be obtained.

Drill cuttings will be routinely monitored for radiation and hazardous material using field screening equipment in accordance with a site-specific health and safety plan and a radiation work permit. Potentially contaminated cuttings and development purgewater will be handled, transported, and dispositioned in accordance with EII 4.2, "Interim Control of Unknown, Suspected Hazardous and Mixed and Radioactive Waste" and EII 10.3, "Purgewater Management," respectively. If the level of contamination requires changes in well design or well location, the EPA and Washington State Department of Ecology (Ecology) will be notified prior to making the changes.

Several boreholes will be drilled beyond their final completion depth into the confining zone beneath the bottom of the uppermost hydrologic unit. These boreholes will provide data on the potential for downward migration of contamination. They will also provide stratigraphic and hydrologic information that is used as a framework for contaminant transport models. Data from these boreholes will be correlated with data from wells drilled to similar depths, such as 199-K-10, 199-K-32B, and 199-K-106A.

A configuration diagram for the boreholes drilled beyond their final completion depth is shown in Figure 5. This diagram includes a summary of the planned sampling regime, as well as expected lithologies. After drilling into the confining interval, the boreholes will be plugged back and completed near the top of the unconfined aquifer as a 'shallow' monitoring well. The remaining boreholes will be drilled to a total depth near the water table and completed as shallow monitoring wells.

After the boreholes have been drilled to total depth, a permanent stainless steel well casing and screen will be installed. As the temporary carbon steel casing is removed, the filter pack and annular seal materials will be emplaced around the permanent casing. An exception to this normal design will be made with one of the Phase II wells, which will be completed as a hybrid using PVC for the final casing above the stainless steel screen. This hybrid is being constructed to accommodate geophysical tests that cannot be conducted in a steel-cased well. A construction schematic for the hybrid well is shown in Figure 6.

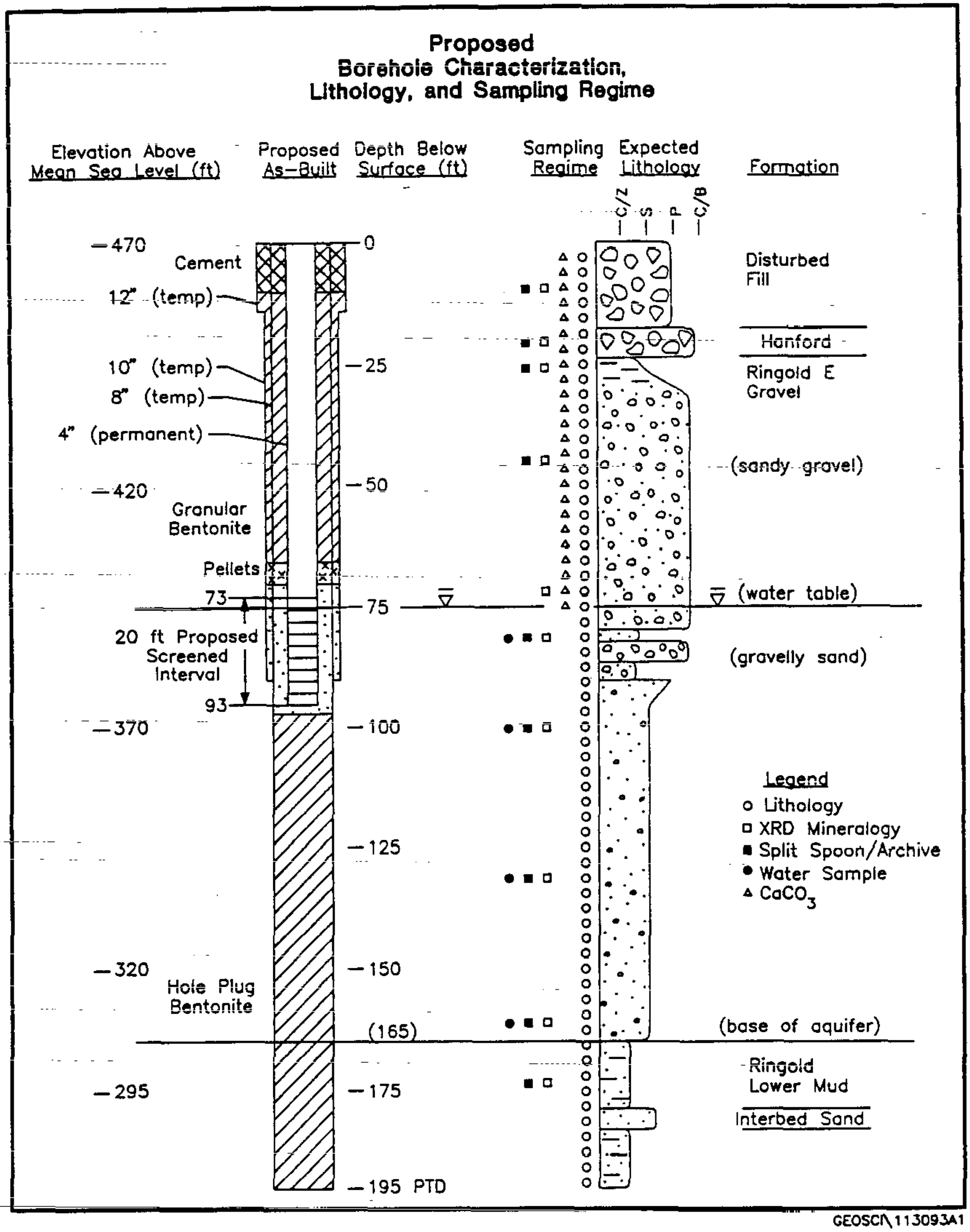

Figure 5. Construction Schematic for Characterization Boreholes.

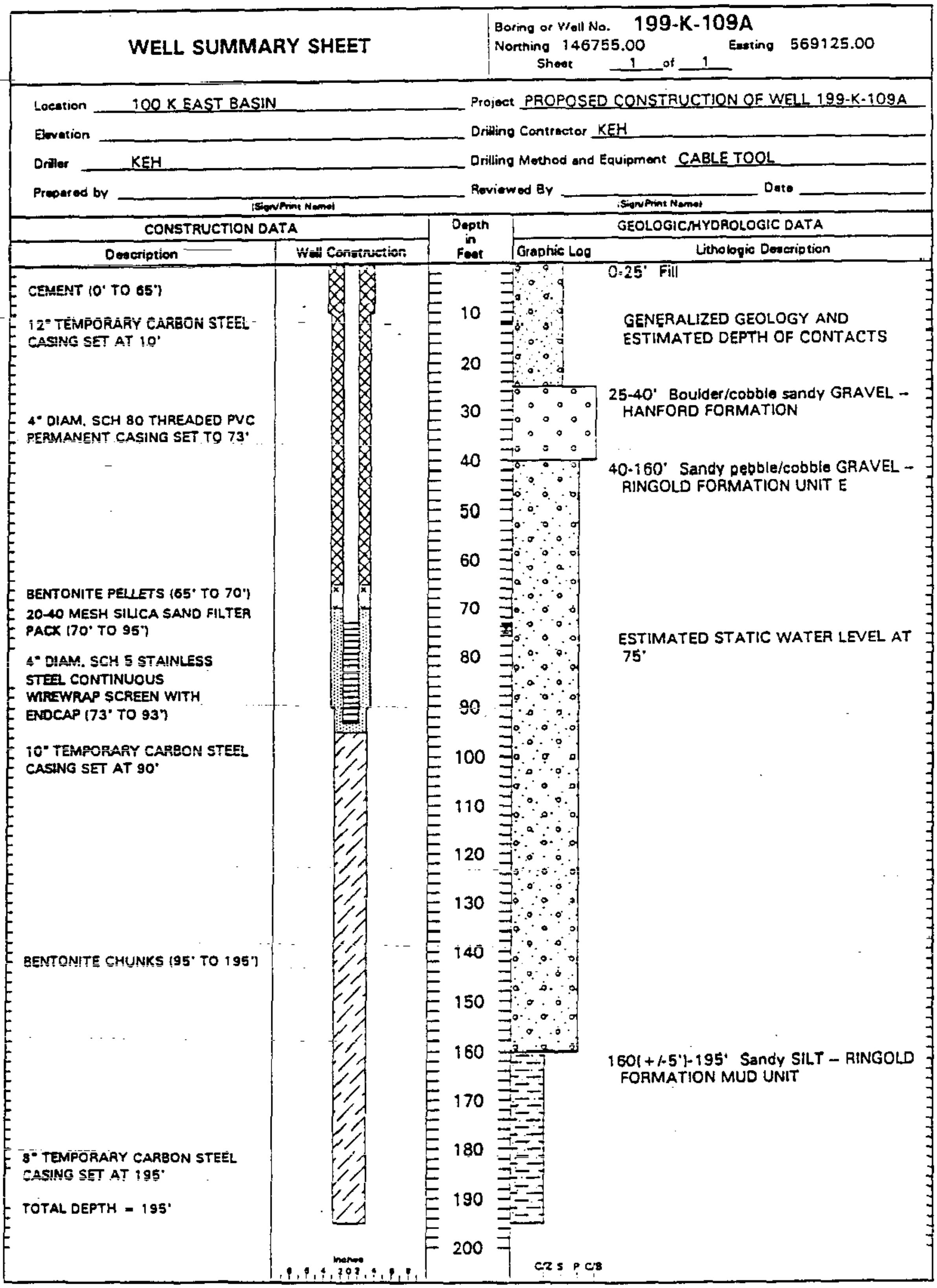

Figure 6. Construction Schematic for Hybrid Well.

3.2 CASING/SCREENING DESIGN

New wells drilled during FY 1994 will be constructed of stainless steel casing and screen (continuous wire wrap), with one exception, which will have a final casing of PVC. Any sampling devises and/or foreign materials will be removed from the borehole prior to construction. After the total depth has been reached for the characterization boreholes, they will be plugged back to within 1 m (3 ft) of the bottom of the screened interval (approximately 6.4 m (21 ft) below water table) and completed as shallow wells, following procedures described in WHC (1993). The project scientist or well site geologist will determine the filter pack size and screen slot size based on guidelines outlined in Procedure 9.1 "Guidance for Installation of Permanent Well Materials" (WHC 1992a). The sand filter pack will be placed in the annulus between the temporary 8-in-dia casing and the permanent 4-in-dia casing and screen as the temporary casing is withdrawn. The sand filter pack will be placed approximately 0.31 to 1 m (1 to 3 ft) below the screen to 1 to 2 m (3 to 5 ft) above the top of the screen.

A bentonite pellet seal will be placed immediately above the sand filter pack and will extend upward for 1 to 2 m (3 to 6 ft) (see Figure 4). The annulus above this seal will be filled with dry granular bentonite to a depth approximately 3 m (10 ft) below the ground surface. The well casing will extend 0.3 to 1 m (1 to 2 ft) above ground surface and will be protected by an outer stainless steel casing and a locking cap. The protective casing and four guard posts will be set into the ground and cemented in place with a 4-ft by 4-ft by 6-in-thick concrete pad. A brass survey marker will be placed in the concrete pad. The well identification number will be permanently added to the protective casing, one of the guard posts, and the survey marker.

When selecting the screen interval for obtaining representative groundwater samples, variability in water levels caused by seasonal or other long-term changes will be considered. The water table in the 100-K Area is typically established at no less than 117 m (385 ft) elevation above mean sea level (equivalent to 35 m (115 ft) below land surface). Water levels in the proposed wells will not be significantly influenced by river stage fluctuations due to their distance inland from the river. Screen lengths will be 6.1 m (20 ft) and installed approximately 5.5 m (18 ft) below the water table. Screen intervals will be chosen by the well site geologist and project scientist at the time of drilling.

3.3 WELL DEVELOPMENT AND COMPLETION

Following construction, the wells will be developed using procedures described in EII 10.4, "Well Development Activities." If development water cannot achieve a turbidity of less than 5 NTU, an explanation will be prepared by the well site geologist and documented in the well log. All groundwater discharged from the wells during development will be handled in accordance with EII 10.3, "Purgewater Management." Groundwater samples may be collected to determine the handling and disposal requirements for the purgewater.

After completion, the project scientist may elect to have the new wells viewed with a downhole video camera to ensure the wells are clean and undamaged. Dedicated, sampling pumps will be installed in each well in accordance with EII 6.4, "Resource Protection Well Services."

3.4 WELL SURVEY

The wells will be surveyed for location and elevation by qualified surveyors. The ground surface (brass survey marker) and top-of-casing reference elevations will be determined to within 0.001 m (0.01 ft) and referenced to the National Geodetic Vertical Datum of 1929. Horizontal location coordinates will be determined to the nearest 0.01 m (0.1 ft) and expressed in the Washington State Plane Coordinate System of 1983, South Zone. All measurements will be referenced to a common datum. A mark will be placed on the casing to indicate the location that was surveyed.

4.0 GEOLOGIC AND HYDROLOGIC CHARACTERIZATION

This section describes activities that will improve the current understanding of the geologic and hydrologic setting of the 100-K Area. It begins with a brief overview of the setting. A description of the larger region containing the 100-K Area is presented in Delaney et al. (1991) and a more detailed description of the 100-K Area is presented in Lindberg (1993), which includes new information resulting from wells installed under the environmental restoration program during FY 1992. The following overview of the hydrologic setting is from Lindberg (1993) unless otherwise cited.

4.1 OVERVIEW OF GEOLOGIC SETTING

The 100-K Area is located along the Columbia River in the northern part of the Hanford Site. It is situated on sediments associated with glaciation and meandering river channels. These sediments fill a topographic and structural low, the Wahluke syncline, formed between the Saddle Mountains on the north and the Gable Butte/Gable Mountain ridges on the south. The sedimentary fill is underlain by Columbia River basalt. Figure 7 shows the major geologic features of the region and Figure 8 shows the principal stratigraphic and hydrologic units at the 100-K Area.

Sediments at the surface are loose, poorly sorted sands and gravels, informally referred to as the Hanford formation. Large areas of the surface have been modified during preparation of foundations for the reactor area facilities, including excavations to depths of 10 m (30 ft). Consequently, a significant portion of the upper unsaturated sediment section consists of engineered fill material. The Hanford sediments are underlain by somewhat more consolidated sands and gravels of the Ringold Formation. The uppermost aquifer system is contained in this formation. Figure 9 is a cross section through the 100-K Area, perpendicular to the Columbia River shoreline. This cross section shows the relationship between the various geologic units and the unconfined aquifer system.

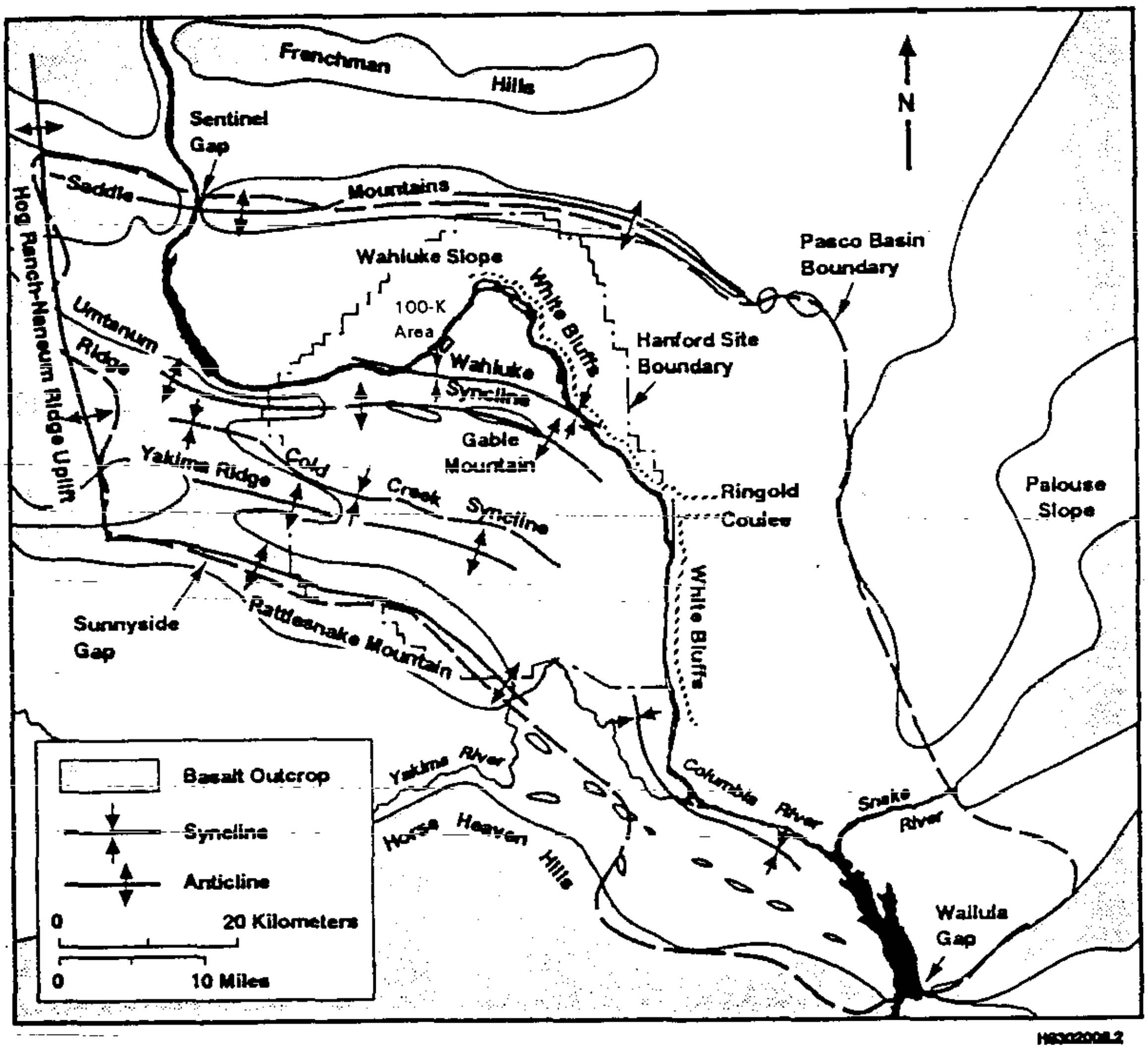

Figure 7. Geologic Features of the Pasco Basin. (Lindberg 1993)

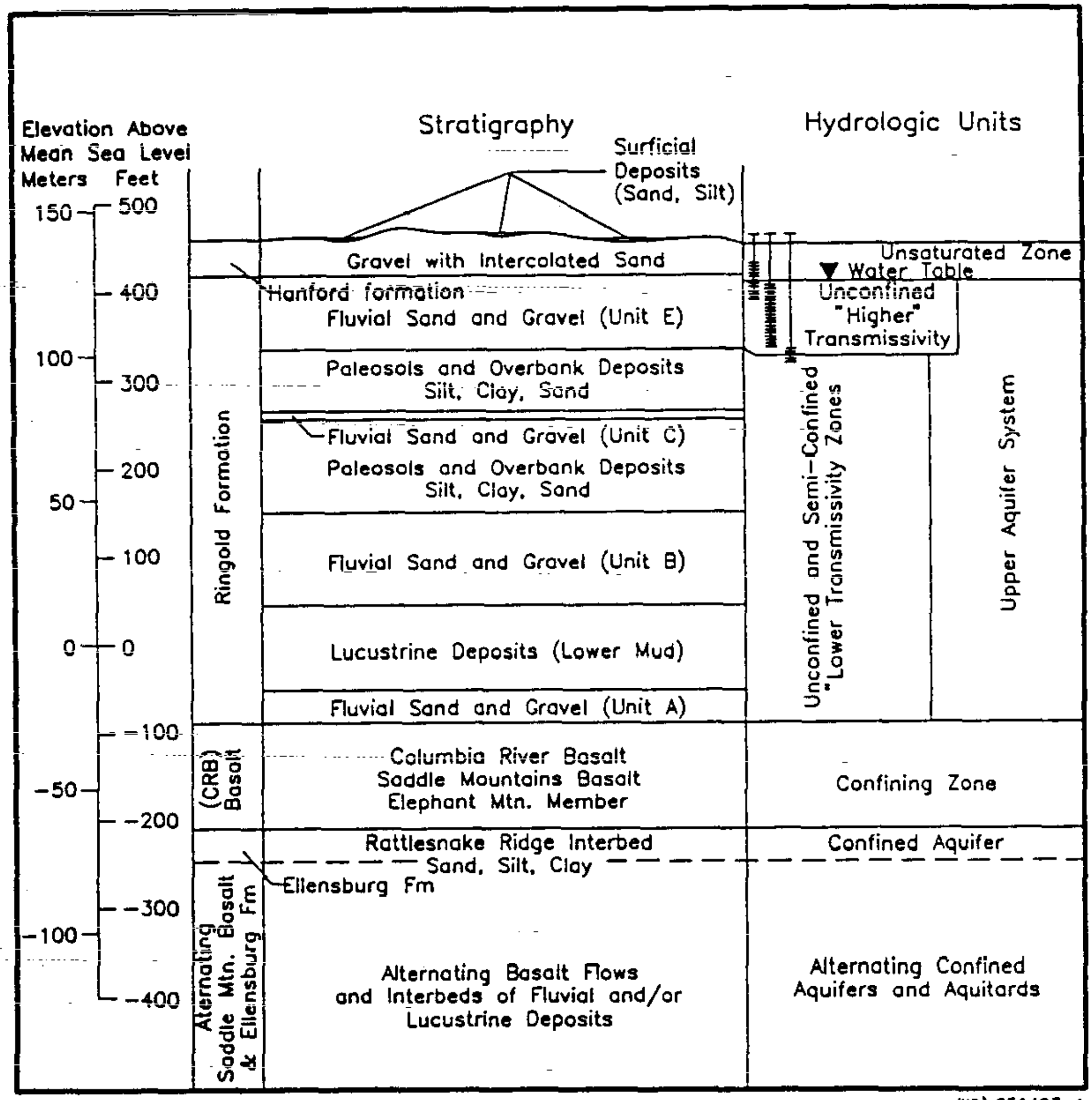

Figure 8. Stratigraphic and Hydrologic Units in the 100-K Area. (Lindberg 1993)

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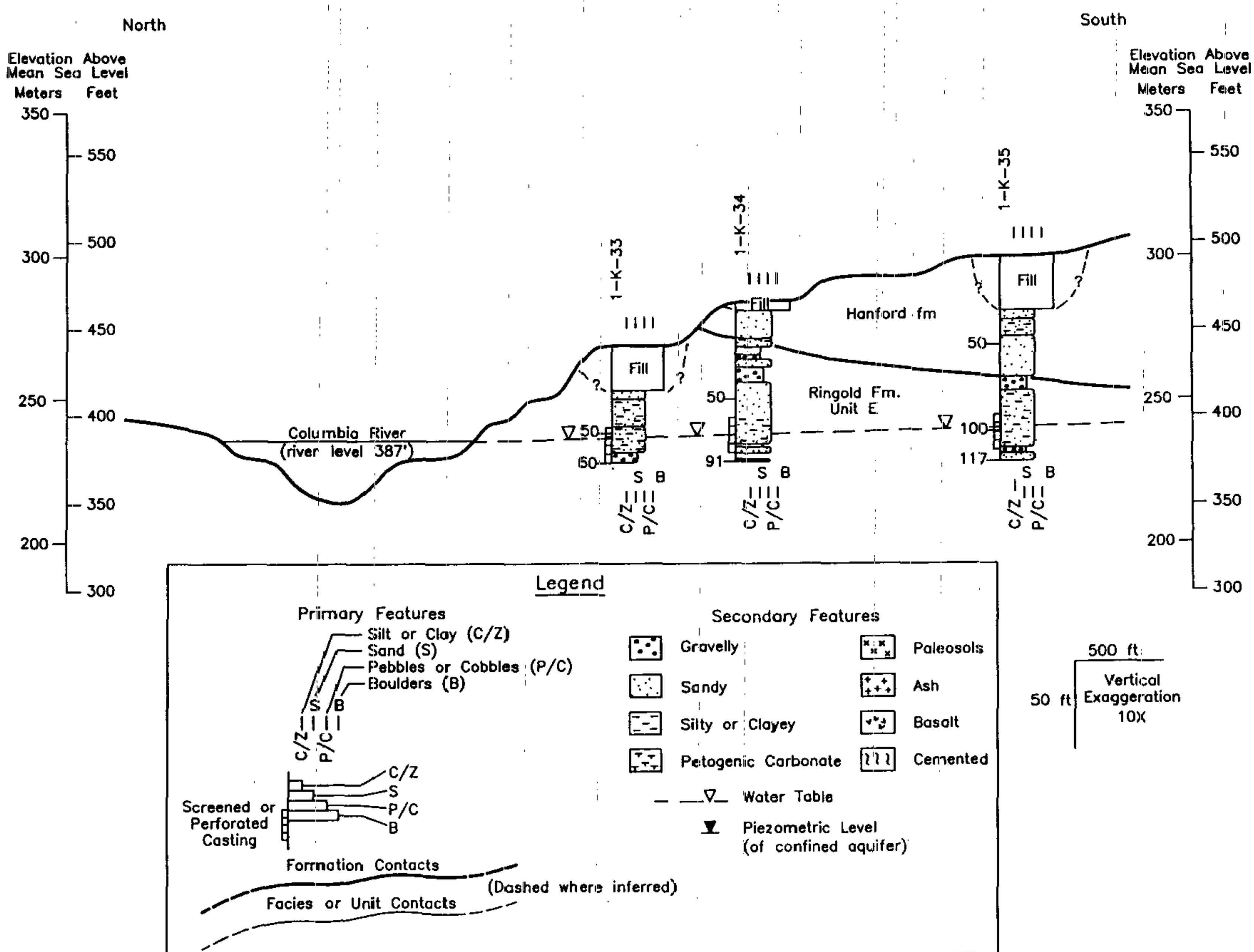

Figure 9. Geologic Cross Section Near K-West Basin.
(modified from Lindberg 1993)

Nearly all of the uppermost aquifer beneath the 100-K Area is contained within Unit E of the Ringold Formation. The uppermost aquifer extends from the water table, at a depth of 22 m (72 ft) below land surface, to the top of a fine-grained unit (see Figure 9). This aquifer averages 18 m (60 ft) in thickness. Current information suggests that the aquifer is comprised of silty sandy gravel. However, this interpretation is based primarily on data from shallow boreholes, which only penetrate the uppermost part of the aquifer, at the water table. Only three wells within the 100-K area are currently available to provide information from deeper horizons (wells 199-K-10, 199-K-32B, and 199-K-106A).

Groundwater flows in a general direction of south to north through the 100-K Area, ultimately discharging into the river. Figure 10 is a water table map for April 1993, which represents the seasonal low for the water table. Typical long-term average flow is measured in feet per day. Variability in flow is caused by (1) seasonal gradient changes in the water table, (2) river stage fluctuations at daily, weekly, and seasonal cycles, and (3) by heterogeneity in aquifer hydraulic properties.

4.2 SAMPLING DURING WELL CONSTRUCTION

As the new wells are drilled, selected sediment samples will be submitted for physical and chemical testing. Geologic, moisture, and calcium carbonate samples will be collected at changes in lithology, and when significant changes in moisture content are observed (EPA 1986 and 1992). All sampling will be conducted in accordance with EII 5.2, "Soil and Sediment Sampling." A general description of the borehole cuttings between sampling intervals will be recorded by the well site geologist in order to obtain a continuous lithologic record. When conditions permit, split-spoon sampling (minimum 4-in-dia, 2-ft-long drive tube) will be used to recover intact, undisturbed, and representative samples from the borehole. At least one split-spoon sample will be collected within the screen interval for each borehole to help with screen slot size selection.

The well site geologist will describe the samples in the field and record the descriptions on borehole logs per EII 9.1, "Geologic Logging." Every sample collected will be recorded on a borehole log at the drill site. Detailed field lithologic descriptions will include color, texture, sorting, bulk mineralogy, roundness, relative calcium carbonate reactivity, consolidation, and cementation. All drilling and well construction data, sample depths, radiological and chemical survey points, etc., will be documented on the borehole logs.

The site geologist will select representative samples for further laboratory analyses. These analyses include selected chemical characteristics, grain size distribution, physical properties, and mineralogy (Table 2). The primary criterion for determining which samples and/or core are submitted for further laboratory analyses is a change in lithology. The objective is to obtain a representative sample for each lithologic unit encountered.

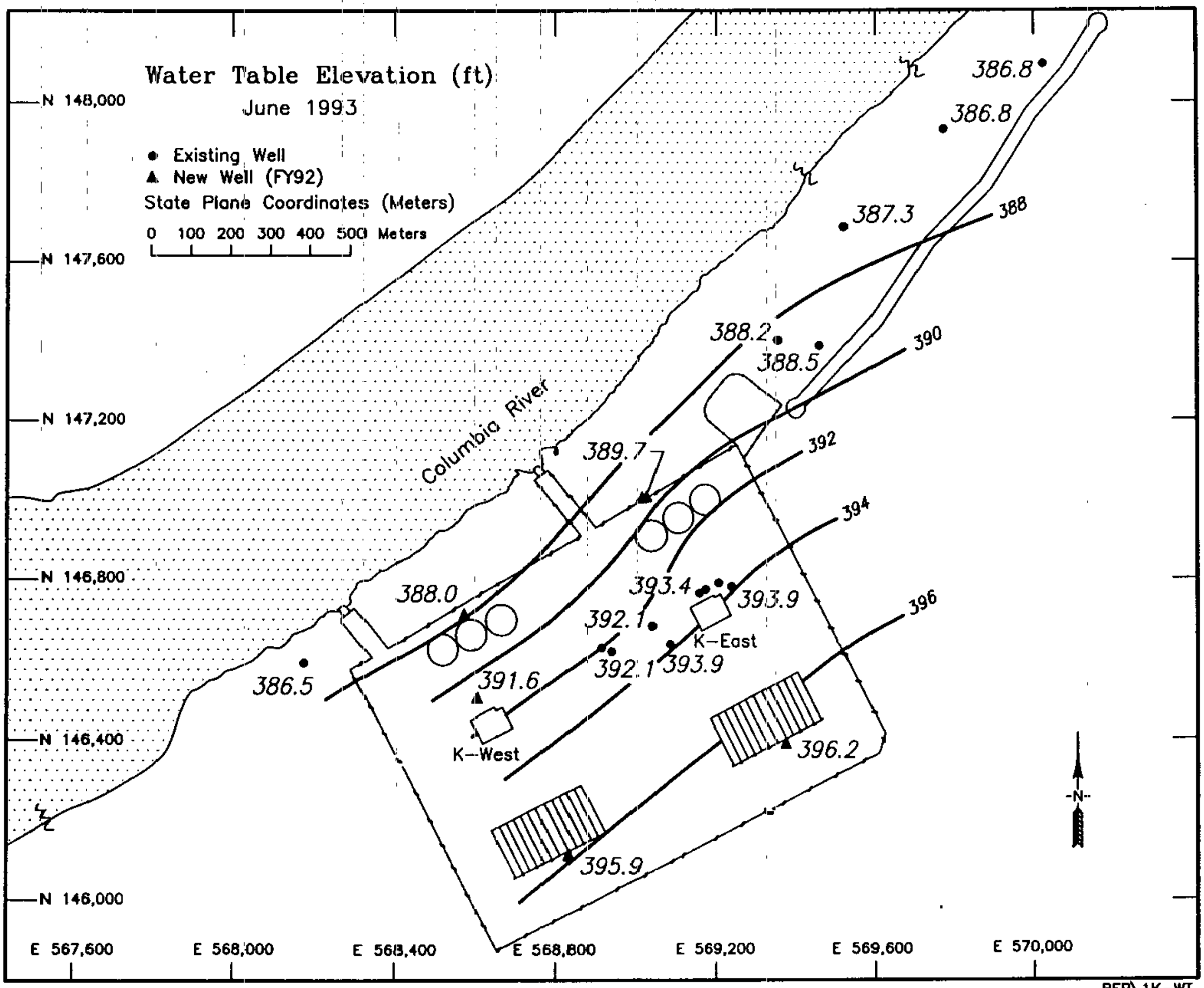

Figure 10. 100-K Area Water Table Map for June 1993. (Data source: GeoDAT)

Table 2. Sediment Sample Collection Criteria and Laboratory Analyses.

Criteria for sampling	Sampling type	Laboratory analyses
change in lithology; within screen interval	core barrel grab or split spoon	particle size by sieve or pipette/hydrometer[a]
change in lithology; within screen interval; every 5 ft above water table (archive)	core barrel grab, cuttings, or split spoon	calcium carbonate and moisture
change in lithology occurring above the water table	split spoon	saturated hydraulic and moisture retention bulk density
change in lithology occurring below the water table (archive)	split spoon	bulk density and saturated hydraulic conductivity
change in lithology and selected intervals based on gamma log	core barrel grab, cuttings, or split spoon	mineralogy by XRD

[a]Size analysis by pipette or hydrometer when sieve analysis indicates >50% silt- and clay-sized particles.

Selected soil samples from the various lithologic units encountered will be analyzed for mineralogy using X-ray diffraction (XRD). These data will be compared with spectral gamma logging results. Previous studies have shown that gamma-ray data are correlated with potassium-rich minerals, such as clays and feldspars. The correlation between spectral gamma logging results and mineralogy is useful in identifying geologic marker horizons, which might otherwise be missed by only obtaining sediment samples. A major advantage of geophysical logging is the continuous downhole record it provides.

The proposed deep boreholes will be drilled into a confining interval located below the uppermost unconfined hydrologic unit. These boreholes will provide sampling access as part of the characterization effort previously outlined. The shallow boreholes will be drilled just deep enough to place the screen interval in the uppermost part of the aquifer and will be sampled only for geologic descriptions and selected physical properties. Additional sampling may be warranted by discovery of unanticipated lithologies and/or indications of contamination.

All sampling activities will be conducted in accordance with WHC procedures (WHC 1988 and 1992a). Special handling requirements may be associated with the type of analysis, laboratory procedures for the analysis, or regulatory requirements. Samples normally will be transferred to a temporary sample handling/evaluation area at the well site. The geologic characteristics of the samples will be described and the samples will be logged according to sample material, type, etc. Samples for chemical analysis will be packaged and shipped to a laboratory in accordance with EII 5.1, "Chain of Custody," EII 5.10, "Obtaining Sample Identification Numbers and Accessing HEIS Data," and EII 5.11, "Sample Packaging and Shipping."

The sediment sampling protocol for the deep charaterization boreholes, is summarized in Table 3. The table lists the physical and chemical analyses that will be conducted and identifies responsibilities for collecting; packaging, labeling, and transporting; and laboratory analyses. Sediment sampling and analysis quality assurance requirements and data quality objectives meet those described in WHC (1993b).

Table 3. Sediment Sampling Protocol for Characterization Boreholes.

Sample use	Collector	Packaging, labels, COC, and transport	Analytical laboratory
particle size	well site geologist	well site geologist	geotechnical engineering laboratory
calcium carbonate and moisture (archive to Hanford geological sample library)	well site geologist	well site geologist	geotechnical engineering laboratory
bulk density and saturated hydraulic conductivity (archive to Hanford geological sample library)	well site geologist	well site geologist	geotechnical engineering laboratory
X-ray diffraction	well site geologist	well site geologist	Washington State University
aquifer base water sample	Geosciences' operational sampling team	Geosciences' operational sampling team	various: via PNL statement of work

A minimum of two 6-in core sleeves or two 1-pint sample jars will be set aside as archive samples for each sampling event, assuming sufficient sample material is recovered. The archived samples will be used for future analyses if needed, and also will support auditing activities. Archived cores will be retained in their original plastic or stainless-steel liners and covered at the ends with Teflon (a trademark of E.I. dupont de Nemours & Company) caps. Teflon tape inside plastic end caps is acceptable if Teflon caps are not available. The caps will be securely taped to the liner to achieve an airtight seal. Archive samples will be delivered with a completed chain of custody form to the Hanford Geological Sample Library for archival.

All samples will receive a radiation release survey sticker prior to shipment. No drilling fluids, including water, will be added to the borehole unless necessary and approved by the well site geologist. This will make detection of perched water zones easier, allow collection of representative moisture samples, and minimize any impact on groundwater chemistry.

4.3 CHEMICAL/RADIOLOGICAL ANALYSES OF SEDIMENTS

No significant soil column contamination has been documented during the installation of previous wells near the K-West and K-East Basins. Sediment sample data for FY 1992 well 199-K-34, which is located near the Phase I wells at K-West Basin, are presented in Appendix B. Based on these results, a complete radiological and chemical analysis of sediment samples and cuttings is not justified. However, all sediment samples will be routinely monitored for volatile compounds and radioactive contaminants with field screening instruments. If contamination is detected, samples will be sent to a laboratory and analyzed for constituents listed in Table 4, as appropriate.

Table 4. Optional Constituent List for Sediment Samples.

Analysis category	Reference method	Constituents
Metals (ICP)	SW-846 (6010)	Aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, tin, vanadium, and zinc
Metals (AA)	SW-846 (7060) SW-846 (7421) SW-846 (7471)	Arsenic Lead Selenium
Physical properties	SW-846 (9080 or 9081) SW-846 (9045) ASTM (D-4373)	Cation exchange capacity pH Total carbonate (as $CaCO_3$)
Anions	EPA 300.2	Bromide, chloride, fluoride, phosphate, sulfate, nitrate, and nitrite
Indicator parameters	SW-846 (9060)	Total organic carbon
Volatile organics	SW-846 (8240)	(numerous compounds)
Radiation	SW-846 (9310) SW-846 (9315A) EPA 901.1 (No reference method)	Gross alpha Gross beta Gamma scan Natural uranium

4.4 GEOPHYSICAL LOGGING

Geophysical tools will be used to help define hydrostratigraphic units and to correlate these units among adjacent boreholes. They will also be used to identify zones that are contaminated by gamma-ray emitting radionuclides. The boreholes will be logged during drilling, following the placement of each string of temporary casing, and after well completion in accordance with EII 11.1, "Geophysical Logging." After completion, each well will be re-logged with a sodium-iodide spectral gamma tool to provide a baseline for future radionuclide monitoring and tracking.

The new monitoring wells will be logged with the radionuclide logging system (RLS). These data will define the gross gamma distribution with depth and the concentrations of naturally occurring potassium, uranium, and thorium in the sediments. The spectral data will help establish characteristic distribution curves to define stratigraphic units (see Section 4.1) and to screen for potential radiological contamination. One Phase II well near K-East Basin will be used for determining seismic wave velocities (see Section 2.2.2).

4.5 HYDROLOGIC PARAMETERS

A knowledge of hydrologic parameters contributes to identifying preferred flow paths, aquifer boundaries, the rate and direction of flow, and potential contamination zones. Parameters of interest include results from (1) physical testing of intact soil samples, (2) aquifer tests, flow measurements, and other tests for hydraulic properties, and (3) chemical and radiological analyses of formation water samples.

4.5.1 Physical Properties Tests

Sediment samples from the unsaturated zone above the water table will be obtained to collect data on the permeability of sediments in the vicinity of K-East Basin. A split-spoon sampler will be used to recover intact sediment samples for physical properties tests. The resulting data will support numerical modeling associated with basin leak scenarios and infiltration rates. The primary parameter of concern is undisturbed grain size distribution, although laboratory tests for unsaturated and saturated hydraulic conductivity may be performed if suitable intact samples can be recovered.

Representative samples from the saturated and lower confining intervals will also be obtained using a split-spoon sampler (see Section 4.1). These samples will be analyzed for saturated hydraulic conductivity, bulk density, and grain-size distribution. The results support groundwater flow and contaminant transport numerical models.

4.5.2 Aquifer Testing

Aquifer testing provides site specific hydraulic parameters that are used to characterize the aquifer, help define aquifer boundaries, and support numerical models for groundwater flow. Procedures for well testing are contained in EII 10.1, "Aquifer Testing." Any residual debris and drilling fluids will be removed from the borehole before testing is conducted.

Slug tests will be used in the new wells to obtain estimates of aquifer transmissivity. Slug testing is routinely used on the Hanford Site because it does not produce purgewater. However, slug tests are not reliable in highly permeable sediments, such as Hanford and Ringold gravelly sands, and may be representative only of conditions very near the well bore. Also, slug testing results may be affected by the well construction method. Aquifer testing that involves pumping groundwater out of the well is an option that may be exercised if appropriate means to handle the purgewater are available at the time the wells are ready for testing.

The primary purpose for the new wells near the fuel storage basins is to monitor groundwater conditions beneath the basins, and not necessarily to obtain aquifer hydraulic properties. Consequently, the well design may not be optimal for producing representative hydraulic testing data. This caveat is appropriate for any subsequent interpretation of aquifer testing results.

4.5.3 Groundwater Analyses During Drilling

Groundwater data from the immediate vicinity of the fuel storage basins are currently available only for samples collected at the water table. No data are available from greater depths in the aquifer, with the exception of sample results recently obtained during the drilling of 199-K-106A near K-West Basin. Consequently, groundwater samples will be collected at selected intervals within the unconfined aquifer during the drilling of the deeper characterization boreholes, to help determine the potential for downward migration of contamination.

A water sampling device, capable of retrieving samples from discrete intervals, will be used to collect water samples during drilling. The device is deployed below the bottom of the temporary casing and opened in an attempt to obtain a representative sample of formation water. These water samples will be analyzed for contaminant indicator constituents, such as gross alpha, gross beta, gamma scan, carbon-14, and tritium. The water sample from the base of the uppermost hydrologic unit will be analyzed for a more comprehensive list of constituents (Table 5). Water sampling and analysis quality assurance requirements and data quality objectives meet those described in WHC (1993b).

Table 5. Constituent List and Analytical Methods for Water Samples.

Analysis category	Reference method	Constituents
Metals (filtered/ unfiltered)	SW-846 (6010)	Aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, tin, vanadium, and zinc
Anions	ASTM D4327-88 or EPA 300.2	Bromide, chloride, fluoride, phosphate, sulfate, nitrate, and nitrite
Indicator parameters	SW-846 (9060) SW-846 (9020)	Total organic carbon Total organic halogen
Physical properties	ASTM D1067 SM 214 SM 209 ASTM D1125 ASTM D1293	Alkalinity Turbidity Total dissolved solids Conductivity pH
Radiation	SW-846 (9310) SW-846 (9315A) (reference methods not available)	Gross alpha Gross beta Tritium and carbon-14 Gamma scan

5.0 DOCUMENTATION AND REPORTING

This section describes the documentation associated with the completed groundwater monitoring well. It also describes how new information gained during the installation and operation of the well will be reported.

5.1 WELL CONSTRUCTION DATA PACKAGES

A data package will be prepared after the wells are completed. This package will contain all well construction and borehole data derived during the investigation and installation including borehole stratigraphy, geophysical logs, details of well completion, aquifer test results, well development, analytical testing results, and survey data. This record document is validated and verified per WHC (1992a), Procedure 4.3 "Well Data Management."

5.2 GEOHYDROLOGIC CHARACTERIZATION REPORT

A characterization report will be prepared that summarizes the new information gained during the installation of these wells. The report will include the results of sediment and water sampling during drilling, revised or new interpretations of hydrogeologic units, and any other newly discovered information relative to contaminants in the soil column and groundwater beneath the K-West and K-East Basins. This report will include maps of water table elevations and water quality characteristics, the results of aquifer tests, as-built diagrams for the new wells, and the results of geophysical logging.

The new hydrogeologic information will be integrated with existing information to form a conceptual model for the groundwater flow system in the 100-K Area. Professional judgement will be used to determine the adequacy of the model for the purpose of describing the concentration, extent, and motion characteristics for contaminants introduced to this flow regime. The capability to predict the concentration, rate of movement, and extent of potential future releases of hazardous constituents from the basins is of particular importance. Equally important is the capability to monitor the release of hazardous constituents to the Columbia River.

During the preparation of the characterization report and development of a conceptual model for the flow regime at 100-K Area, it should become apparent whether Phase III wells will be necessary. Peer review by the three parties involved (DOE, EPA, and Ecology) will be used to form a consensus for that decision.

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APPENDIX A

CONSTRUCTION DIAGRAMS AND SUMMARY SHEETS FOR WELLS LOCATED NEAR K-EAST AND K-WEST BASINS

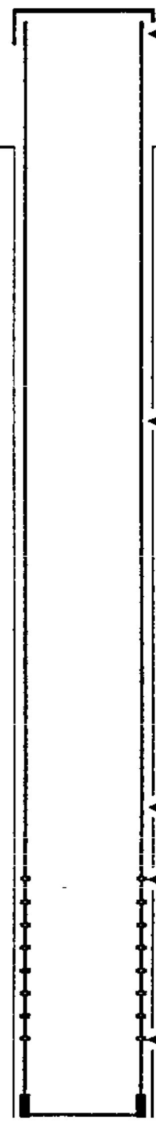
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 199-K-10 — TEMPORARY WELL NO: Test Well #10
Drilling Fluid Used: Not documented	Additives Used: Not documented	Hanford Coordinates: N/S N 76,100 E/W W 68,800
Driller's Name: Row	WA State Lic Nr: Not documented	State Coordinates: N 481,200 E 2,226,300
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T____ R____ S________
Date Started: 23Jun52	Date Complete: 06Aug52	Elevation Ground surface (ft): 466.2 Estimated

Depth to water: 74.2-ft Aug52
(Ground surface) ~70.0-ft May61

GENERALIZED STRATIGRAPHY — Driller's Log

0↔3: TOP SOIL
3↔30: GRAVEL and SAND, hit BOULDER at 3 ft and 8 ft
30↔40: Sandy SILT
40↔45: Sandy SILT and GRAVEL
45↔46: GRAVEL, no SILT
46↔70: Cement GRAVEL and SAND
70↔75: Cement GRAVEL
75↔84: Cement GRAVEL and SAND
84↔89: 75% coarse SAND and 25% GRAVEL
89↔91: Not documented
91↔96: 80% GRAVEL, 20% GRAVEL
96↔97: 95% SAND and 5% GRAVEL
97↔97.5: SAND
97.5↔102: 60% SAND and 40% GRAVEL
102↔104: 98% SAND
104↔106.5: 70% GRAVEL and 30% SAND
106.5↔108: Big BOULDERS, GRAVEL & SAND
108↔115: 70% GRAVEL and 30% SAND
115↔126: 70% Cement GRAVEL & 30% SAND
126↔132.5: 90% GRAVEL and 10% SAND
132.5↔133: 60% GRAVEL and 40% SAND
133↔136: 90% GRAVEL and 10% SAND
136↔140: 80% GRAVEL and 20% SAND
140↔150: 80% SAND
150↔156: 50% GRAVEL and 50% SAND
156↔160: 70% GRAVEL and 20% coarse SAND
160↔163: 80% GRAVEL and 15% coarse SAND
163↔164: 70% GRAVEL with sandy SILT
164↔170: CLAY and SILT, GRAVEL, SHALE and SAND



Elevation of reference point: (top of casing)	[466.66-ft]
Height of reference point above ground surface	[0.5-ft]
Depth of surface seal	[ND]
Type of surface seal: None documented	
I.D. of surface casing (If present)	[ND]
I.D. of riser pipe:	[12-in]
Type of riser pipe: Carbon steel	
Diameter of borehole:	[13-in nom]
Type of filler: Not documented	
Depth top of perforations:	[155-ft]
Description of perforations: 12 holes/ft	
Depth bottom of perforations:	[165-ft]
Depth bottom of casing:	[170-ft]
Depth bottom of borehole:	[170-ft]

Drawing By: RKL/1-K-10.ASB Date: 01Apr93

Reference: HANFORD WELLS

9413276.1793

WELL CONSTRUCTION AND COMPLETION SUMMARY

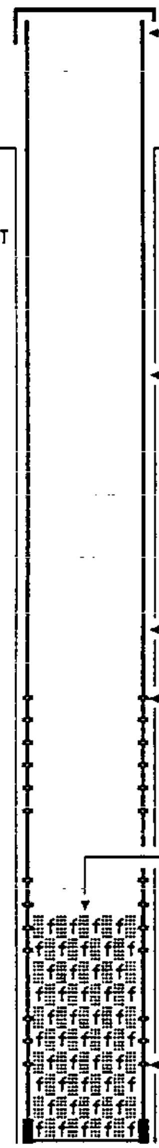
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 199-K-11 TEMPORARY RDA-DC6-11 WELL NO: 100-K-11
Drilling Fluid Used: Not documented	Additives Used: Not documented	Hanford Coordinates: N/S N 76,030 E/W W 68,733
Driller's Name: Gentz	WA State Lic Nr: Not documented	State Coordinates: N 481,155 E 2,226,397
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 15Jul52	Date Complete: 09Aug52	Elevation Ground surface (ft): 466.0 Estimated

Depth to water: 73.0-ft Aug52
(Ground surface) 70.2-ft Aug91

GENERALIZED STRATIGRAPHY | Driller's Log

0–15: BOULDERS
15–20: BOULDERS and GRAVEL
20–28: Coarse GRAVEL
28–35: 75% GRAVEL with 25% SAND and SILT
35–42: SAND and SILT
42–45: SAND and SILT
45–50: SAND, SILT and coarse GRAVEL
50–55: 50% GRAVEL and 50% SAND and SILT
55–65: Cement GRAVEL
65–80: Coarse GRAVEL
80–85: GRAVEL and SAND
85–97: GRAVEL, SAND and a little SILT
97–105: SAND and coarse GRAVEL
105–110: GRAVEL and a little SAND
110–115: Coarse GRAVEL
115–118: GRAVEL and SAND
118–120: PEBBLES and a little SAND
120–130: PEBBLES, GRAVEL and SAND
130–140: GRAVEL and SAND
140–164: Coarse GRAVEL and SAND
164–165: Coarse GRAVEL
165–170: SAND and SILT
170 : CLAY

REMEDIATION:
Jun74, by Bultena
Perforated 69–90-ft



Elevation of reference point: [467.66-ft]
(top of casing)
Height of reference point above ground surface [1.7-ft]
Depth of surface seal [ND]
Type of surface seal: None documented
I.D. of surface casing (If present) [ND]
I.D. of riser pipe: [6-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [7-in nom]
Type of filler: Not documented
Depth top of perforations: [69-ft]
Description of perforations: 69–90-ft 4 holes/ft 110–135 and 150–160-ft cuts not documented
Depth to bottom, 126.6-ft 01Aug91
Depth bottom of perforations: [160-ft]
Depth bottom of casing: [170-ft]
Depth bottom of borehole: [170-ft]

Drawing By: RKL/1-K-11.ASB Date: 01Apr93

Reference: HANFORD WELLS

WELL SUMMARY SHEET

Boring or Well No. 199-K-32B
Northing | Easting
Sheet 1 of 3

Location: K-AREA
Project: 100-KR-4
Elevation:
Drilling Contractor: K.E.H.
Driller: D. St George
Drilling Method and Equipment: Cable Tool BE-22W
Prepared by: (Sign/Print Name)
Reviewed By: (Sign/Print Name)
Date:

CONSTRUCTION DATA

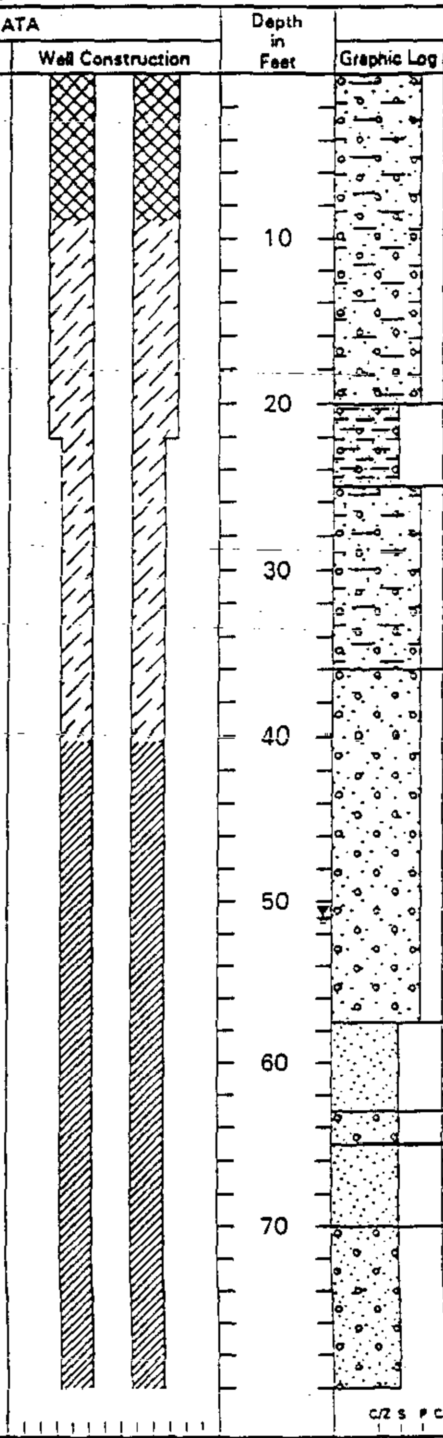
Description

- Portland Cement, 0.0 - 8.8'.
- Bentonite Crumbles, 8.8 - 40.3'.
- Temporary Casing (12"), 0.0 - 22.0'.
- SS Well Casing (4", T-304), +2.7 - 157.5'.

GEOLOGIC/HYDROLOGIC DATA

Lithologic Description

- 0.0 - 20.0' Silty Sandy GRAVEL (Fill).
- 20.0 - 25.0' Gravelly Silty SAND.
- 25.0 - 36.0' Silty Sandy GRAVEL.
- 36.0 - 57.5' Sandy GRAVEL.
- 57.5 - 63.0' SAND.
- 63.0 - 65.0' Gravelly SAND.
- 65.0 - 70.0' SAND.
- 70.0 - 85.0' Gravelly SAND.

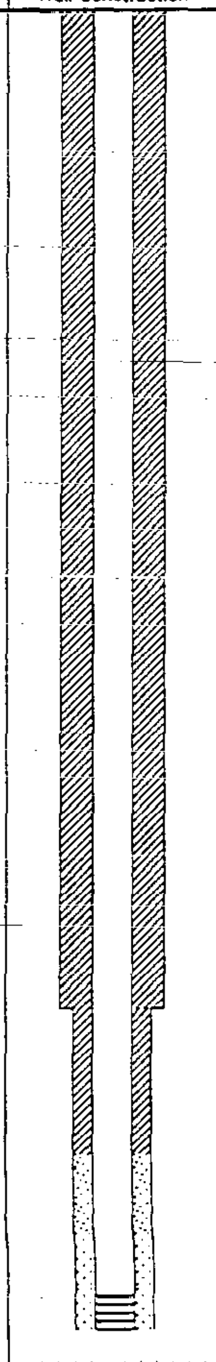


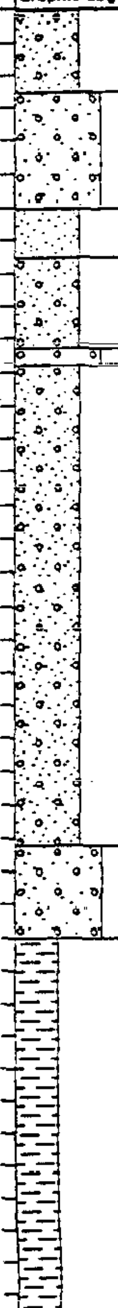
WELL SUMMARY SHEET

Boring or Well No. 199-K-32B
Northing
Easting
Sheet 2 of 3

Location K-AREA
Project 100-KR-4
Elevation
Drilling Contractor K.E.H.
Driller D. St George
Drilling Method and Equipment Cable Tool BE-22W
Prepared by (Sign/Print Name)
Reviewed By (Sign/Print Name)
Date

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Well Construction		Graphic Log	Lithologic Description
				85.0 - 92.0' Sandy GRAVEL.
		90		92.0 - 95.0' SAND.
				95.0 - 100.5' Gravelly SAND.
Bentonite Grout, 40.3 - 149.2'.		100		100.5 - 101.5' GRAVEL.
				101.5 - 130.5' Gravelly SAND.
		110		
		120		
		130		130.5 - 136.0' Sandy GRAVEL.
				136.0 - 160.0' CLAY.
Temporary Casing (10"), 0.0 - 140.2'.		140		
Silica Sand (40/100), 149.2 - 154.0'.		150		
Silica Sand (20/40), 154.0 -				





C/Z S P C/B

WELL SUMMARY SHEET

Boring or Well No. 199-K-32B
Northing
Easting
Sheet 3 of 3

Location K-AREA
Project 100-KR-4
Elevation
Drilling Contractor K.E.H.
Driller D. St George
Drilling Method and Equipment Cable Tool BE-22W
Prepared by (Sign/Print Name)
Reviewed By (Sign/Print Name)
Date

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Well Construction		Graphic Log	Lithologic Description
176.3'. SS Wire Wrap 10-Slot Screen (T-304), 157.5 - 167.5'.				160.0 - 163.0' SAND.
				163.0 - 176.0' CLAY.
		170		
Temporary Casing (8"), 0.0 - 175.5'.				Total Depth = 176.0 Feet.
		180		
		190		
		200		
		210		
		220		
		230		
			C/Z S F C/B	

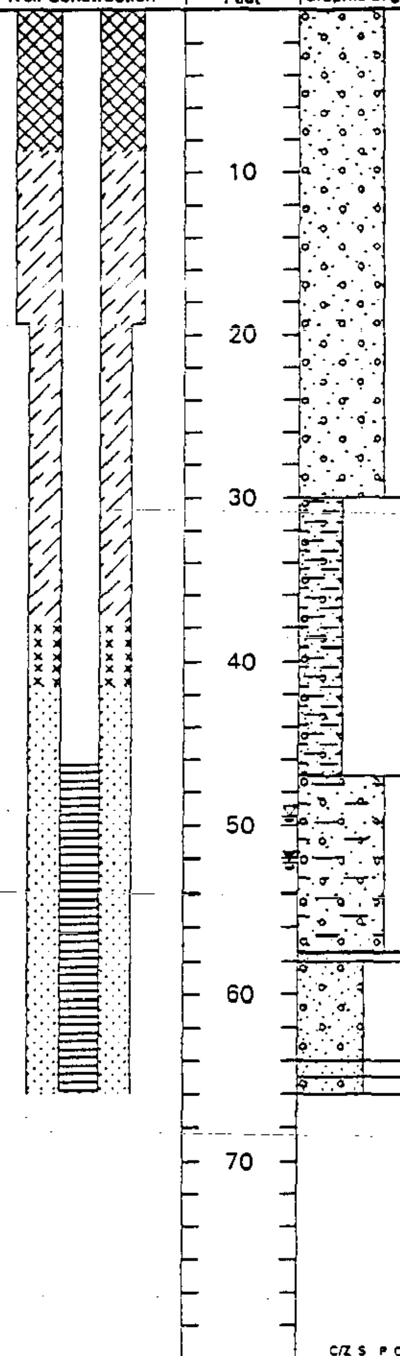
WELL SUMMARY SHEET

Boring or Well No. 199-K-33
Northing Easting
Sheet 1 of 1

Location K-AREA
Project 100-KR-4
Elevation
Drilling Contractor K.E.H.
Driller D. St George
Drilling Method and Equipment Cable Tool 8W-22W
Prepared by (Sign/Print Name)
Reviewed By (Sign/Print Name)
Date

CONSTRUCTION DATA: Description	Depth in Feet	GEOLOGIC/HYDROLOGIC DATA: Lithologic Description
Portland Cement, 0.0 - 8.6'.		0.0 - 30.0' Sandy GRAVEL.
Bentonite Crumbles, 8.6 - 37.7'.	10	
Temporary Casing (10"), 0.0 - 19.3'.	20	
SS Well Casing (4", T-304), +2.3 - 45.8'.	30	30.0 - 47.0' Gravelly Sandy SILT.
Bentonite Pellets, 37.7 - 41.4'.	40	
Silica Sand (20/40), 41.4 - 66.6'.		47.0 - 57.5' Silty Sandy GRAVEL.
SS Wire Wrap 10-Slot Screen (T-304), 45.8 - 65.8'.	50	
	60	57.5 - 58.0' SAND.
		58.0 - 64.0' Gravelly SAND.
		64.0 - 65.0' SAND.
Temporary Casing (8"), 0.0 - 66.0'.		65.0 - 66.0' Gravelly SAND.
	70	Total Depth = 66.0 Feet

Well Construction / Graphic Log



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WELL SUMMARY SHEET

Boring or Well No. 199-K-34

Northing ______ Easting ______

Sheet 1 of 2

Location: K-AREA

Project: 100-KR-4

Elevation: ______

Drilling Contractor: K.E.H.

Driller: D.H. Smith, K. Olsen

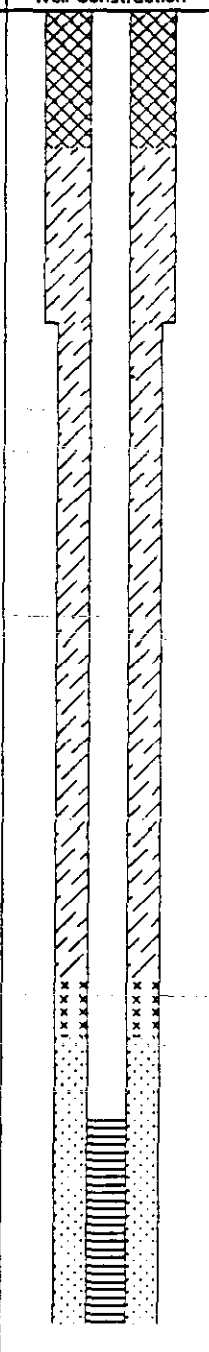
Drilling Method and Equipment: Cable Tool BE-22W

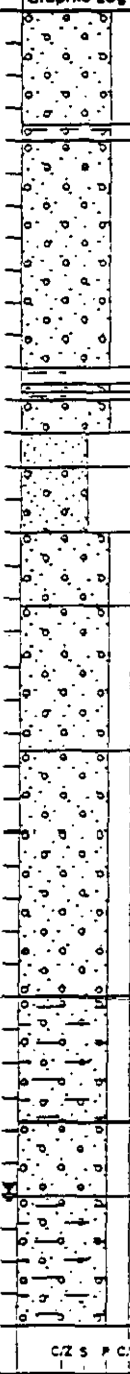
Prepared by ______ (Sign/Print Name)

Reviewed By ______ (Sign/Print Name)

Date ______

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Well Construction		Graphic Log	Lithologic Description
Portland Cement, 0.0 - 8.4'.				0.0 - 7.0' Sandy GRAVEL.
				7.0 - 8.0' Silty GRAVEL.
		10		8.0 - 22.0' Sandy GRAVEL.
Bentonite Crumbles, 8.4 - 59.0'.				
Temporary Casing (10"), 0.0 - 19.2'.		20		
				22.0 - 23.0' SILT.
				23.0 - 23.5' Sandy GRAVEL.
				23.5 - 24.0' SILT.
				24.0 - 26.0' Sandy GRAVEL.
				26.0 - 28.0' SAND.
SS Well Casing (4", T-304), +4.0 - 66.9'.		30		28.0 - 32.0' Gravelly SAND.
				32.0 - 36.5' Sandy GRAVEL.
				36.5 - 45.0' Gravelly SAND.
		40		
				45.0 - 60.0' Sandy GRAVEL.
		50		
Bentonite Pellets, 59.0 - 62.5'.		60		60.0 - 67.5' Silty Sandy GRAVEL.
Silica Sand (20/40), 62.5 - 88.7'.				67.5 - 72.0' Sandy GRAVEL.
SS Wire Wrap 10-Slot Screen (T-304), 66.9 - 86.9'.		70		72.0 - 80.0' Silty Sandy GRAVEL.





WELL SUMMARY SHEET

Boring or Well No. 199-K-34
Northing
Easting
Sheet 2 of 2

Location K-AREA
Project 100-KR-4
Elevation
Drilling Contractor K.E.H.
Driller D.H. Smith, K. Olsen
Drilling Method and Equipment Cable Tool BE-22W
Prepared by
(Sign/Print Name)
Reviewed By
(Sign/Print Name)
Date

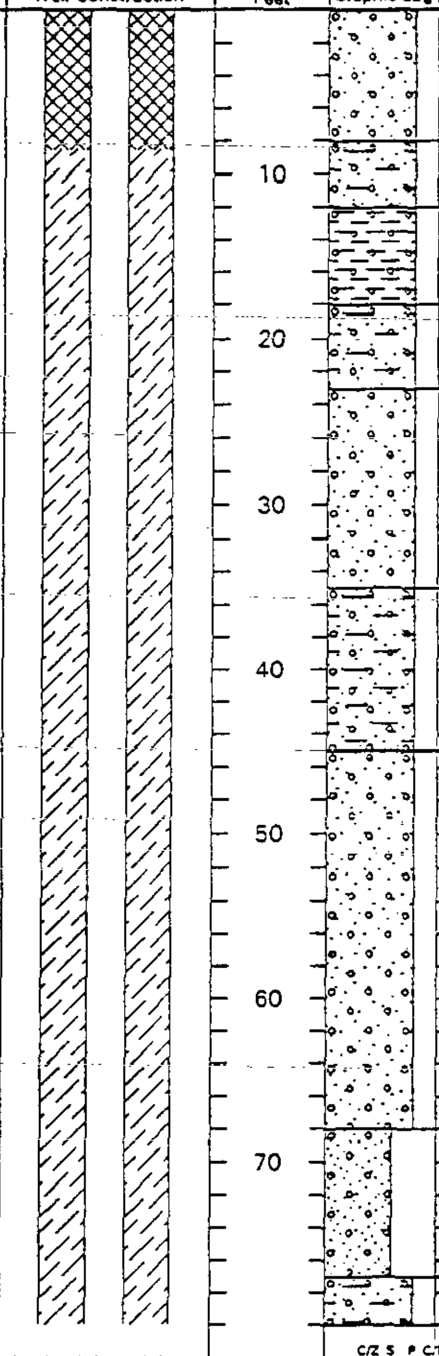
CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Well Construction		Graphic Log	Lithologic Description
				80.0 - 81.0' Sandy GRAVEL.
				81.0 - 82.0' SAND.
				82.0 - 86.0' Sandy GRAVEL.
				86.0 - 89.0' SAND.
Formation Slough, 88.7 - 90.6'. Temporary Casing (8"), 0.0 - 90.6'.		90		89.0 - 90.6' Sandy GRAVEL. Total Depth = 90.6 Feet.
		100		
		110		
		120		
		130		
		140		
		150		
			C/Z S P C/B	

WELL SUMMARY SHEET

Boring or Well No. 199-K-35
Northing Easting
Sheet 1 of 2

Location K-AREA
Project 100-KR-4
Elevation
Drilling Contractor K.E.H.
Driller D.H. Smith
Drilling Method and Equipment Cable Tool BE-22W
Prepared by ______ (Sign/Print Name)
Reviewed By ______ (Sign/Print Name)
Date ______

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Well Construction		Graphic Log	Lithologic Description
Portland Cement, 0.0 - 8.4'.				0.0 - 8.0' Sandy GRAVEL.
		10		8.0 - 12.0' Silty Sandy GRAVEL.
Bentonite Crumbles, 8.4 - 82.1'.				12.0 - 18.0' Silty GRAVEL.
		20		18.0 - 23.0' Silty Sandy GRAVEL.
SS-Well Casing (4", T-304), +1.4 - 88.6'.		30		23.0 - 35.0' Sandy GRAVEL.
		40		35.0 - 45.0' Silty Sandy GRAVEL.
		50, 60		45.0 - 68.0' Sandy GRAVEL.
		70		68.0 - 77.0' Gravelly SAND.
				77.0 - 80.0' Slightly Silty Sandy GRAVEL.



WELL SUMMARY SHEET

Boring or Well No. 199-K-35
Northing Easting
Sheet 2 of 2

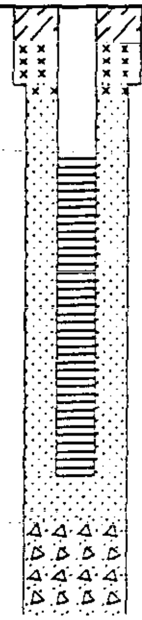
Location K-AREA
Project 100-KR-4
Elevation
Drilling Contractor K.E.H.
Driller D.H. Smith
Drilling Method and Equipment Cable Tool BE-22W
Prepared by (Sign/Print Name)
Reviewed By (Sign/Print Name)
Date

CONSTRUCTION DATA

Description

- Bentonite Pellets, 82.1 - 85.6'.
- Temporary Casing (10"), 0.0 - 84.7'.
- Silica Sand (20/40), 85.6 - 111.1'.
- SS Wire Wrap 10-Slot Screen (T-304), 88.6 - 108.6'.
- Formation Slough, 111.1 - 117.0'.
- Temporary Casing (8"), 0.0 - 116.0'.

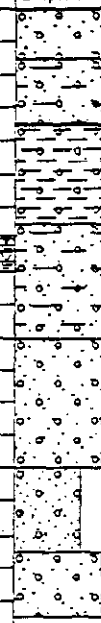
Well Construction



Depth in Feet: 90, 100, 110, 120, 130, 140, 150

GEOLOGIC/HYDROLOGIC DATA

Graphic Log



C/Z S P C/B

Lithologic Description

- 80.0 - 83.0' Sandy GRAVEL.
- 83.0 - 87.0' Silty Sandy GRAVEL.
- 87.0 - 93.0' Silty GRAVEL.
- 93.0 - 100.0' Silty Sandy GRAVEL.
- 100.0 - 108.0' Sandy GRAVEL.
- 108.0 - 113.0' Gravelly SAND.
- 113.0 - 117.0' Sandy GRAVEL.
- Total Depth = 117.0 Feet.

9413276.1803

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: Evans
Drilling Company: Not documented
Date Started: 29Aug79

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 21Sep79

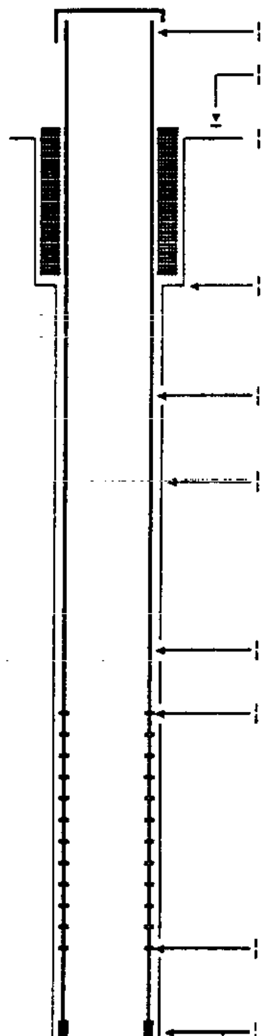
WELL NUMBER: 199-K-27
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 76,400 E/W W 68,000
State Coordinates: N 481,500 E 2,227,000
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): 462.8-ft Estimated

Depth to water: 70.0-ft Sep79
(Ground surface) 69.0-ft Apr91

GENERALIZED STRATIGRAPHY Driller's Log

0-18: 40% COBBLES, 20% BOULDERS 20% PEBBLES, 10% SAND, 10% SILT
18-42: 60% COBBLES, 15% BOULDERS, 15% SAND, 5% PEBBLES, 5% SILT
42-75: 60% COBBLES, 20% PEBBLES, 10% SAND, 10% SILT
75-90: 30% COBBLES, 30% PEBBLES, 30% SAND, 10% SILT

Pump inlet (Depth from TOC)
10/8/91 80.39



466.67 ΔE

Elevation of reference point: (top of casing) [465.00-ft]
Height of reference point above ground surface [2.2-ft]
Depth of surface seal [20-ft]
Type of surface seal: Cement grout
I.D. of surface casing (If present) [8-in pulled]
Surface casing to 20-ft Grouted with 36-gals cement
I.D. of riser pipe: [6-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [7-in nom]
Type of filler: Not documented
Depth top of perforations: [65-ft]
Description of perforations: 65-85-ft, 2 cuts/rd/ft
Depth bottom of perforations: [85-ft]
Depth bottom of casing: [90-ft]
Depth bottom of borehole: [90-ft]

Drawing By: RKL/1-K-27.ASB Date: 01Apr93
Reference: HANFORD WELLS

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 199-K-28 TEMPORARY WELL NO:
Drilling Fluid Used: Not documented	Additives Used: Not documented	Hanford Coordinates: N/S N 76,350 E/W W 68,060
Driller's Name: L. Bultena	WA State Lic Nr: Not documented	State Coordinates: N 481,475 E 2,227,070
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 16Aug79	Date Complete: 05Sep79	Elevation Ground surface (ft): 462.6-ft Estimated

Depth to water: ~~74.0-ft Sep79~~
(Ground surface) 68.2-ft Apr91

465.97

GENERALIZED STRATIGRAPHY — Driller's Log

0-15: Not documented
15-36: Brown SAND and large COBBLES
36-47: Brown SAND and COBBLES
47-59: CALICHE
59-65: BOULDER
65-70: Cemented GRAVEL and CALICHE
70-81: Cemented GRAVEL with some CALICHE
81-90: Not documented

Pump Inlet;
Depth from TOC 76.1
10/8/91

Elevation of reference point: (top of casing)	[465.00-ft]
Height of reference point above ground surface	[2.4-ft]
Depth of surface seal	[20-ft]
Type of surface seal: Cement grout	
I.D. of surface casing (If present)	[8-in pulled]
Surface casing to 20-ft Grouted with 144-gals cement	
I.D. of riser pipe:	[6-in]
Type of riser pipe: Carbon steel	
Diameter of borehole:	[7-in nom]
Type of filler: Not documented	
Depth top of perforations:	[63-ft]
Description of perforations: 63-88-ft, 2 cuts/rd/ft	
Depth bottom of perforations:	[88-ft]
Depth bottom of casing:	[90-ft]
Depth bottom of borehole:	[90-ft]

Drawing By: RKL/1-K-28.ASB Date: 01Apr93

Reference: HANFORD WELLS

WELL CONSTRUCTION AND COMPLETION SUMMARY

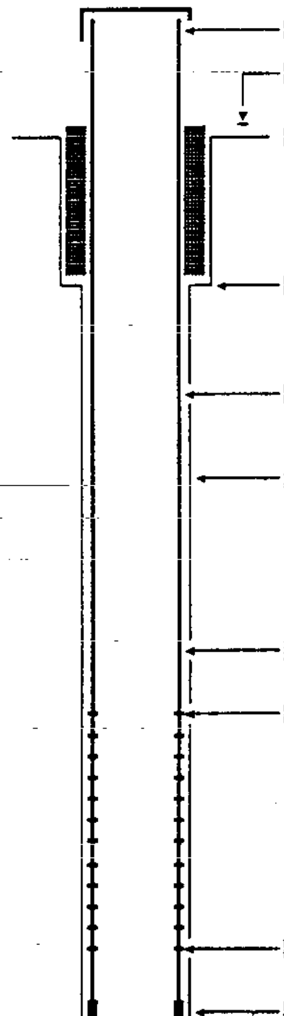
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 199-K-29 / TEMPORARY WELL NO:
Drilling Fluid Used: Not documented	Additives Used: Not documented	Hanford Coordinates: N/S N 76,500 E/W W 68,775
Driller's Name: L. Bultena	WA State Lic Nr: Not documented	State Coordinates: N 481,625 E 2,227,350
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 06Sep79	Date Complete: 24Sep79	Elevation Ground surface (ft): 461.8-ft Estimated

Depth to water: 74.0-ft Sep79
(Ground surface) 68.6-ft Apr91

GENERALIZED STRATIGRAPHY — Driller's Log

0-18: Not documented
18-35: Brown SAND, COBBLES and BOULDERS
35-40: Brown SAND and COBBLES
40-50: Tight SAND and GRAVEL and COBBLES
50-85: Compacted SAND and COBBLES
85-90: Not documented

Pump inlet:
Depth from TOC
10/8/91 77.95



467.39 ...

Elevation of reference point: (top of casing) [465.00-ft]
Height of reference point above ground surface [3.2-ft]
Depth of surface seal [20-ft]
Type of surface seal: Cement grout
I.D. of surface casing (If present) [8-in pulled]
Surface casing to 20-ft
Grouted with 63-gals cement
I.D. of riser pipe: [6-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [7-in nom]
Type of filler: Not documented
Depth top of perforations: [65-ft]
Description of perforations: Not documented
Depth bottom of perforations: [85-ft]
Depth bottom of casing: [90-ft]
Depth bottom of borehole: [90-ft]

Drawing By: RKL/1-K-29.ASB Date: 01Apr93

Reference: HANFORD WELLS

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 199-K-30 TEMPORARY WELL NO:
Drilling Fluid Used: Not documented	Additives Used: Not documented	Hanford Coordinates: N/S N 76,500 E/W W 67,700
Driller's Name: Evans	WA State Lic Nr: Not documented	State Coordinates: N 481,600 E 2,227,400
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 03Oct79	Date Complete: 30Oct79	Elevation Ground surface (ft): 462.4-ft Estimated

Depth to water: 70.0-ft Oct79
(Ground surface) 67.8-ft Apr91

466.20

GENERALIZED STRATIGRAPHY   Driller's Log

0-10: 10% BOULDER, 20% COBBLES 40% PEBBLES, 20% SAND, 10% SILT
10-20: 20% BOULDERS, 40% COBBLES 20% PEBBLES, 15% SAND and 5% SILT
20-22: Not documented
22-30: 10% BOULDERS, 40% COBBLES, 30% PEBBLES, 15% SAND, and 5% SILT
30-40: 5% BOULDERS, 30% COBBLES, 50% PEBBLES, 10% SAND and 5% SILT
40-50: 40% COBBLES, 48% PEBBLES, 15% SAND and 5% SILT
50-53: 50% COBBLES, 40% PEBBLES 20% SAND
53-60: 40% COBBLES, 40% PEBBLES, 15% SAND, 5% SILT
60-70: 40% COBBLES, 35% PEBBLES, 20% SAND, 5% SILT
70-78: 30% COBBLES, 30% PEBBLES, 20% SAND, 5% SILT
78-90: 90% SAND, 10% SILT

Pump inlet
Depth from TOC
3/93 72.41

Elevation of reference point: (top of casing) [465.00-ft]
Height of reference point above ground surface [2.6-ft]
Depth of surface seal [ND]
Type of surface seal: Cement grout
I.D. of surface casing (If present) [8-in pulled]
Surface casing to 20-ft Grouted with 63-gals cement
I.D. of riser pipe: [6-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [7-in nom]
Type of filler: Not documented
Depth bottom of casing: [70-ft]
Casing pulled back to expose screen
Telescoping screen 67-87-ft, #10 slot
Cement plug at bottom
Depth bottom of borehole: [90-ft]

Drawing By: RKL/1-K-30.ASB   Date: 01Apr93
Reference: HANFORD WELLS

APPENDIX B

SEDIMENT SAMPLE RESULTS FROM WELL 199-K-34

12/16/93
(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	65	SVOA	Benzo(a)pyrene	330.00	UG/KG		R	
	65	SVOA	Indeno(1,2,3-cd)pyrene	330.00	UG/KG		R	
	65	SVOA	Dibenz[a,h]anthracene	330.00	UG/KG		R	
	65	SVOA	Benzo(ghi)perylene	330.00	UG/KG		R	
	65	SVOA	Benzo(a)anthracene	330.00	UG/KG		R	
	65	SVOA	Bis(2-ethylhexyl) phthalate	330.00	UG/KG		R	
	65	SVOA	Chrysene	330.00	UG/KG		R	
	65	SVOA	Di-n-octylphthalate	330.00	UG/KG		R	
	65	SVOA	Benzo(b)fluoranthene	330.00	UG/KG		R	
	65	SVOA	Benzo(k)fluoranthene	330.00	UG/KG		R	
	65	SVOA	Diethylphthalate	730.00	UG/KG		R	
	65	SVOA	4-Chlorophenylphenyl ether	330.00	UG/KG		R	
	65	SVOA	Fluorene	330.00	UG/KG		R	
	65	SVOA	4-Nitroaniline	790.00	UG/KG		R	
	65	SVOA	4,6-Dinitro-o-cresol	790.00	UG/KG		R	
	65	SVOA	N-Nitrosodiphenylamine	330.00	UG/KG		R	
	65	SVOA	4-Bromophenylphenyl ether	330.00	UG/KG		R	
	65	SVOA	Hexachlorobenzene	330.00	UG/KG		R	
	65	SVOA	Pentachlorophenol	790.00	UG/KG		R	
	65	SVOA	Phenanthrene	330.00	UG/KG		R	
	65	SVOA	Anthracene	330.00	UG/KG		R	
	65	SVOA	9H-carbazole	330.00	UG/KG		R	
	65	SVOA	Di-n-butylphthalate	330.00	UG/KG		R	
	65	SVOA	Fluoranthene	330.00	UG/KG		R	
	65	SVOA	Pyrene	330.00	UG/KG		R	
	65	SVOA	Butylbenzylphthalate	330.00	UG/KG		R	
	65	SVOA	3,3'-Dichlorobenzidine	330.00	UG/KG		R	
64	65	RAD	Thorium-232	.50	pCi/g	.32		
64	65	RAD	Gross alpha	5.50	pCi/g	5.90	R	
64	65	RAD	Gross beta	14.00	pCi/g	4.10	J	
64	65	RAD	Uranium-235	.03	PCI/G	.03	U	
64	65	RAD	Uranium-238	.47	pCi/g	.16		
64	65	RAD	Plutonium-238	-.00	PCI/G	.01	U	
64	65	RAD	Plutonium-239/40	-.00	PCI/G	.01	U	
64	65	RAD	Americium-241	0.00	pCi/g	.01	U	
64	65	RAD	Strontium-90	1.10	pCi/g	.66	U	
64	65	RAD	Carbon-14	-2.20	pCi/g	12.00	U	
64	65	RAD	Potassium-40	7.50	pCi/g	1.40		
64	65	RAD	Iron-59	.70	pCi/g		U	
64	65	RAD	Chromium-51	2.70	pCi/g		U	
64	65	RAD	Cobalt-60	.11	pCi/g		U	
64	65	RAD	Zinc-65	.26	pCi/g		U	
64	65	RAD	Ruthenium-106	.85	pCi/g		U	
64	65	RAD	Cesium-134	.12	pCi/g		U	
64	65	RAD	Cesium-137	.09	pCi/g		U	
64	65	RAD	Europium-152	.16	pCi/g		U	

12/16/93
(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
64	65	RAD	Europium-154	.10	pCi/g		U	
64	65	RAD	Radium-226	.38	pCi/g	.20		
64	65	RAD	Thorium-228	.57	pCi/g	.14		
64	65	ANIONS	Fluoride	1.50	mg/kg			
64	65	ANIONS	Sulfate	31.00	mg/kg			
	65	PEST/PCB	Alpha-BHC	1.70	UG/KG		UJ	
	65	PEST/PCB	Beta-BHC	1.70	UG/KG		U	
	65	SVOA	Phenol	330.00	UG/KG		U	
	65	PEST/PCB	Delta-BHC	1.70	UG/KG		UJ	
	65	SVOA	Bis(2-chloroethyl) ether	330.00	UG/KG		U	
	65	PEST/PCB	Gamma-BHC (Lindane)	1.70	UG/KG		U	
	65	SVOA	2-Chlorophenol	330.00	UG/KG		U	
	65	PEST/PCB	Heptachlor	1.70	UG/KG		U	
	65	SVOA	1,3-Dichlorobenzene	330.00	UG/KG		U	
	65	PEST/PCB	Aldrin	1.70	UG/KG		U	
	65	SVOA	1,4-Dichlorobenzene	330.00	UG/KG		U	
	65	PEST/PCB	Heptachlor epoxide	1.70	UG/KG		U	
	65	SVOA	1,2-Dichlorobenzene	330.00	UG/KG		U	
	65	PEST/PCB	Endosulfan I	1.70	UG/KG		U	
	65	SVOA	2-Methylphenol	330.00	UG/KG		U	
	65	PEST/PCB	Dieldrin	3.20	UG/KG		UJ	
	65	SVOA	Bis(2-Chloroisopropyl) ether	330.00	UG/KG		U	
	65	PEST/PCB	4,4'-DDE	3.20	UG/KG		UJ	
	65	SVOA	4-Methylphenol	330.00	UG/KG		U	
	65	PEST/PCB	Endrin	3.20	UG/KG		U	
	65	SVOA	N-Nitroso-di-n-dipropylamine	330.00	UG/KG		U	
	65	PEST/PCB	Endosulfan II	3.20	UG/KG		U	
	65	SVOA	Hexachloroethane	330.00	UG/KG		U	
	65	PEST/PCB	4,4'-DDD	3.20	UG/KG		UJ	
	65	SVOA	Nitrobenzene	330.00	UG/KG		U	
	65	PEST/PCB	Endosulfan sulfate	3.20	UG/KG		U	
	65	SVOA	Isophorone	330.00	UG/KG		U	
	65	PEST/PCB	4,4'-DDT	3.20	UG/KG		U	
	65	SVOA	2-Nitrophenol	330.00	UG/KG		U	
	65	PEST/PCB	Methoxychlor	17.00	UG/KG		U	
	65	SVOA	2,4-Dimethylphenol	330.00	UG/KG		U	
	65	SVOA	Bis(2-Chloroethoxy)methane	330.00	UG/KG		U	
	65	PEST/PCB	Endrin ketone	3.20	UG/KG		U	
	65	SVOA	2,4-Dichlorophenol	330.00	UG/KG		U	
	65	PEST/PCB	Endrin aldehyde	3.20	UG/KG		U	
	65	PEST/PCB	alpha-Chlordane	1.70	UG/KG		U	
	65	SVOA	1,2,4-Trichlorobenzene	330.00	UG/KG		U	
	65	SVOA	Naphthalene	330.00	UG/KG		U	
	65	PEST/PCB	gamma-Chlordane	1.70	UG/KG		U	
	65	SVOA	4-Chloroaniline	330.00	UG/KG		U	
	65	PEST/PCB	Toxaphene	170.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1016	32.00	UG/KG		U	

12/16/93
(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	65	SVOA	Hexachlorobutadiene	330.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1221	65.00	UG/KG		U	
	65	SVOA	4-Chloro-3-methylphenol	330.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1232	32.00	UG/KG		U	
	65	SVOA	2-Methylnaphthalene	330.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1242	32.00	UG/KG		U	
	65	SVOA	Hexachlorocyclopentadiene	330.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1248	32.00	UG/KG		U	
	65	SVOA	2,4,6-Trichlorophenol	330.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1254	32.00	UG/KG		U	
	65	SVOA	2,4,5-Trichlorophenol	790.00	UG/KG		U	
	65	PEST/PCB	Aroclor-1260	32.00	UG/KG		U	
	65	SVOA	2-Chloronaphthalene	330.00	UG/KG		U	
	65	SVOA	2-Nitroaniline	790.00	UG/KG		U	
	65	SVOA	Dimethyl phthalate	330.00	UG/KG		U	
	65	SVOA	Acenaphthylene	330.00	UG/KG		U	
	65	SVOA	3-Nitroaniline	790.00	UG/KG		U	
	65	SVOA	Acenaphthene	330.00	UG/KG		U	
	65	SVOA	2,4-Dinitrophenol	790.00	UG/KG		U	
	65	VOA	Chloromethane	10.00	UG/KG		U	
	65	VOA	Bromomethane	10.00	UG/KG		U	
	65	VOA	Vinyl chloride	10.00	UG/KG		U	
	65	VOA	Chloroethane	10.00	UG/KG		U	
	65	VOA	Methylenechloride	10.00	UG/KG		U	
	65	VOA	Acetone	58.00	UG/KG		U	
	65	VOA	Carbon disulfide	10.00	UG/KG		U	
	65	VOA	1,1-Dichloroethene	10.00	UG/KG		U	
	65	VOA	1,1-Dichloroethane	10.00	UG/KG		U	
	65	VOA	1,2-Dichloroethene	10.00	UG/KG		U	
	65	VOA	Chloroform	10.00	UG/KG		U	
	65	VOA	1,2-Dichloroethane	10.00	UG/KG		U	
	65	VOA	2-Butanone	10.00	UG/KG		U	
	65	VOA	1,1,1-Trichloroethane	10.00	UG/KG		U	
	65	VOA	Carbon tetrachloride	10.00	UG/KG		U	
	65	VOA	Bromodichloromethane	10.00	UG/KG		U	
	65	VOA	1,2-Dichloropropane	10.00	UG/KG		U	
	65	VOA	cis-1,3-Dichloropropene	10.00	UG/KG		U	
	65	VOA	Trichloroethene	10.00	UG/KG		U	
	65	VOA	Dibromochloromethane	10.00	UG/KG		U	
	65	VOA	1,1,2-Trichloroethane	10.00	UG/KG		U	
	65	VOA	Benzene	10.00	UG/KG		U	
	65	VOA	trans-1,3-Dichloropropene	10.00	UG/KG		U	
	65	VOA	Bromoform	10.00	UG/KG		U	
	65	VOA	4-Methyl-2-pentanone	10.00	UG/KG		U	
	65	VOA	2-Hexanone	10.00	UG/KG		U	
	65	VOA	Tetrachloroethene	10.00	UG/KG		U	
	65	VOA	1,1,2,2-Tetrachloroethane	10.00	UG/KG		U	

9413276.1081

12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	65	VOA	Toluene	10.00	UG/KG		U	
	65	VOA	Chlorobenzene	10.00	UG/KG		U	
	65	VOA	Ethylbenzene	10.00	UG/KG		U	
	65	VOA	Styrene	10.00	UG/KG		U	
	65	VOA	Xylenes (total)	10.00	UG/KG		U	
	65	SVOA	4-Nitrophenol	790.00	UG/KG		U	
	65	SVOA	Dibenzofuran	330.00	UG/KG		U	
	65	SVOA	2,4-Dinitrotoluene	330.00	UG/KG		U	
	65	SVOA	2,6-Dinitrotoluene	330.00	UG/KG		U	
	65	SVOA	Diethylphthalate	47.00	UG/KG		J	
	65	SVOA	4-Chlorophenylphenyl ether	330.00	UG/KG		U	
	65	SVOA	Fluorene	330.00	UG/KG		U	
	65	SVOA	4-Nitroaniline	790.00	UG/KG		U	
	65	SVOA	4,6-Dinitro-o-cresol	790.00	UG/KG		U	
	65	SVOA	N-Nitrosodiphenylamine	330.00	UG/KG		U	
	65	SVOA	4-Bromophenylphenyl ether	330.00	UG/KG		U	
	65	SVOA	Hexachlorobenzene	330.00	UG/KG		U	
	65	SVOA	Pentachlorophenol	790.00	UG/KG		U	
	65	SVOA	Phenanthrene	330.00	UG/KG		U	
	65	SVOA	Anthracene	330.00	UG/KG		U	
	65	SVOA	9H-carbazole	330.00	UG/KG		U	
	65	SVOA	Di-n-butylphthalate	280.00	UG/KG		BJ	
	65	SVOA	Fluoranthene	330.00	UG/KG		U	
	65	SVOA	Pyrene	330.00	UG/KG		U	
	65	SVOA	Butylbenzylphthalate	330.00	UG/KG		U	
	65	SVOA	3,3'-Dichlorobenzidine	330.00	UG/KG		U	
	65	SVOA	Benzo(a)anthracene	330.00	UG/KG		U	
	65	SVOA	Bis(2-ethylhexyl) phthalate	330.00	UG/KG		U	
	65	SVOA	Chrysene	330.00	UG/KG		U	
	65	SVOA	Di-n-octylphthalate	330.00	UG/KG		U	
	65	SVOA	Benzo(b)fluoranthene	330.00	UG/KG		U	
	65	SVOA	Benzo(k)fluoranthene	330.00	UG/KG		U	
	65	SVOA	Benzo(a)pyrene	330.00	UG/KG		U	
	65	SVOA	Indeno(1,2,3-cd)pyrene	330.00	UG/KG		U	
	65	SVOA	Dibenz[a,h]anthracene	330.00	UG/KG		U	
	65	SVOA	Benzo(ghi)perylene	330.00	UG/KG		U	
64	65	INORG	Aluminum	6570.00	MG/KG			
64	65	INORG	Antimony	2.80	MG/KG		N	UJ
64	65	INORG	Arsenic	1.40	MG/KG		W	J
64	65	INORG	Barium	74.00	MG/KG			
64	65	INORG	Beryllium	.20	MG/KG			U
64	65	INORG	Cadmium	.20	MG/KG			U
64	65	INORG	Calcium	3450.00	MG/KG			
64	65	INORG	Chromium	25.30	MG/KG		*	J
64	65	INORG	Cobalt	8.20	MG/KG			B
64	65	INORG	Copper	16.30	MG/KG			
64	65	INORG	Iron	14600.00	MG/KG			

12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
64	65	INORG	Lead	4.00	MG/KG		S	
64	65	INORG	Magnesium	3790.00	MG/KG			
64	65	INORG	Manganese	232.00	MG/KG			
64	65	INORG	Mercury	.09	MG/KG			U
64	65	INORG	Nickel	18.00	MG/KG			
64	65	INORG	Potassium	1060.00	MG/KG			
64	65	INORG	Selenium	.69	MG/KG		N*	UJ
64	65	INORG	Silver	.74	MG/KG			U
64	65	INORG	Sodium	367.00	MG/KG			R
64	65	INORG	Thallium	.82	MG/KG		W	UJ
64	65	INORG	Vanadium	34.80	MG/KG			
64	65	INORG	Zinc	35.20	MG/KG			
64	65	INORG	Cyanide	.49	MG/KG			U
	65	SVOA	1,2-Dichlorobenzene	330.00	UG/KG		R	
	65	SVOA	2-Methylphenol	330.00	UG/KG		R	
	65	SVOA	Bis(2-Chloroisopropyl) ether	330.00	UG/KG		R	
	65	SVOA	4-Methylphenol	330.00	UG/KG		R	
	65	SVOA	N-Nitroso-di-n-dipropylamine	330.00	UG/KG		R	
	65	SVOA	Hexachloroethane	330.00	UG/KG		R	
	65	SVOA	Nitrobenzene	330.00	UG/KG		R	
	65	SVOA	Isophorone	330.00	UG/KG		R	
	65	SVOA	2-Nitrophenol	330.00	UG/KG		R	
	65	SVOA	2,4-Dimethylphenol	330.00	UG/KG		R	
	65	SVOA	Bis(2-Chloroethoxy)methane	330.00	UG/KG		R	
	65	SVOA	2,4-Dichlorophenol	330.00	UG/KG		R	
	65	SVOA	1,2,4-Trichlorobenzene	330.00	UG/KG		R	
	65	SVOA	pH Measurement	9.60				
	65	SVOA	Phenol	330.00	UG/KG		R	
	65	SVOA	Bis(2-chloroethyl) ether	330.00	UG/KG		R	
	65	SVOA	2-Chlorophenol	330.00	UG/KG		R	
	65	SVOA	1,3-Dichlorobenzene	330.00	UG/KG		R	
	65	SVOA	1,4-Dichlorobenzene	330.00	UG/KG		R	
	65	SVOA	Naphthalene	330.00	UG/KG		R	
	65	SVOA	4-Chloroaniline	330.00	UG/KG		R	
	65	SVOA	Hexachlorobutadiene	330.00	UG/KG		R	
	65	SVOA	4-Chloro-3-methylphenol	330.00	UG/KG		R	
	65	SVOA	2-Methylnaphthalene	330.00	UG/KG		R	
	65	SVOA	Hexachlorocyclopentadiene	330.00	UG/KG		R	
	65	SVOA	2,4,6-Trichlorophenol	330.00	UG/KG		R	
	65	SVOA	2,4,5-Trichlorophenol	790.00	UG/KG		R	
	65	SVOA	2-Chloronaphthalene	330.00	UG/KG		R	
	65	SVOA	2-Nitroaniline	790.00	UG/KG		R	
	65	SVOA	Dimethyl phthalate	330.00	UG/KG		R	
	65	SVOA	Acenaphthylene	330.00	UG/KG		R	
	65	SVOA	3-Nitroaniline	790.00	UG/KG		R	
	65	SVOA	Acenaphthene	330.00	UG/KG		R	
	65	SVOA	2,4-Dinitrophenol	790.00	UG/KG		R	

12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	65	SVOA	pH Measurement	9.60				
	65	SVOA	4-Nitrophenol	790.00	UG/KG		R	
	65	SVOA	Dibenzofuran	330.00	UG/KG		R	
	65	SVOA	2,4-Dinitrotoluene	330.00	UG/KG		R	
	65	SVOA	2,6-Dinitrotoluene	330.00	UG/KG		R	
64	65	RAD	Uranium-233/234	.39	PCI/G	.16		
64	65	ANIONS	Nitrite Nitrate	2.38	mg/Kg		UJ	
67	68	RAD	Gross alpha	-.09	pCi/g	3.70	R	
67	68	RAD	Gross beta	8.30	pCi/g	4.40	J	
67	68	RAD	Uranium-235	.02	pCi/g	.04	U	
67	68	RAD	Uranium-238	.40	pCi/g	.15		
67	68	RAD	Plutonium-238	.00	pCi/g	.01	U	
67	68	RAD	Plutonium-239/40	.16	pCi/g	.04		
67	68	RAD	Americium-241	.01	pCi/g	.03	R	
67	68	RAD	Strontium-90	.12	pCi/g	.33	U	
67	68	RAD	Carbon-14	-10.00	pCi/g	14.00	U	
67	68	RAD	Potassium-40	8.50	pCi/g	1.40		
67	68	RAD	Iron-59	.47	pCi/g		U	
67	68	RAD	Chromium-51	1.90	pCi/g		U	
67	68	RAD	Cobalt-60	.10	pCi/g		U	
67	68	RAD	Zinc-65	.25	pCi/g		U	
67	68	RAD	Ruthenium-106	.71	pCi/g		U	
67	68	RAD	Cesium-134	.08	pCi/g		U	
67	68	RAD	Cesium-137	.07	pCi/g		U	
67	68	RAD	Europium-152	.12	pCi/g		U	
67	68	RAD	Europium-154	.08	pCi/g		U	
67	68	RAD	Radium-226	.26	pCi/g	.14		
67	68	RAD	Thorium-228	.36	pCi/g	.13		
67	68	RAD	Thorium-232	.43	pCi/g	.26		
67	68	ANIONS	Sulfate	31.00	mg/kg			
67	68	ANIONS	Fluoride	2.10	mg/kg			
	68	PEST/PCB	Alpha-BHC	1.70	UG/KG		UJ	
	68	PEST/PCB	Beta-BHC	1.70	UG/KG		U	
	68	PEST/PCB	Delta-BHC	1.70	UG/KG		UJ	
	68	PEST/PCB	Gamma-BHC (Lindane)	1.70	UG/KG		UJ	
	68	PEST/PCB	Heptachlor	1.70	UG/KG		U	
	68	PEST/PCB	Aldrin	1.70	UG/KG		UJ	
	68	PEST/PCB	Heptachlor epoxide	1.70	UG/KG		U	
	68	PEST/PCB	Endosulfan I	1.70	UG/KG		U	
	68	PEST/PCB	Dieldrin	3.30	UG/KG		UJ	
	68	PEST/PCB	4,4'-DDE	3.30	UG/KG		UJ	
	68	PEST/PCB	Endrin	3.30	UG/KG		U	
	68	PEST/PCB	Endosulfan II	3.30	UG/KG		U	
	68	PEST/PCB	4,4'-DDD	3.30	UG/KG		UJ	
	68	PEST/PCB	Endosulfan sulfate	3.30	UG/KG		U	
	68	PEST/PCB	4,4'-DDT	3.30	UG/KG		U	
	68	PEST/PCB	Methoxychlor	17.00	UG/KG		U	

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(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	68	PEST/PCB	Endrin ketone	3.30	UG/KG		UJ	
	68	PEST/PCB	Endrin aldehyde	3.30	UG/KG		U	
	68	PEST/PCB	alpha-Chlordane	1.70	UG/KG		U	
	68	PEST/PCB	gamma-Chlordane	1.70	UG/KG		U	
	68	PEST/PCB	Toxaphene	170.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1016	33.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1221	67.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1232	33.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1242	33.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1248	33.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1254	33.00	UG/KG		U	
	68	PEST/PCB	Aroclor-1260	33.00	UG/KG		U	
	68	SVOA	Phenol	330.00	UG/KG		U	
	68	SVOA	Bis(2-chloroethyl) ether	330.00	UG/KG		U	
	68	SVOA	2-Chlorophenol	330.00	UG/KG		U	
	68	SVOA	1,3-Dichlorobenzene	330.00	UG/KG		U	
	68	SVOA	1,4-Dichlorobenzene	330.00	UG/KG		U	
	68	SVOA	1,2-Dichlorobenzene	330.00	UG/KG		U	
	68	SVOA	2-Methylphenol	330.00	UG/KG		U	
	68	SVOA	Bis(2-Chloroisopropyl) ether	330.00	UG/KG		U	
	68	SVOA	4-Methylphenol	330.00	UG/KG		U	
	68	SVOA	N-Nitroso-di-n-dipropylamine	330.00	UG/KG		U	
	68	SVOA	Hexachloroethane	330.00	UG/KG		U	
	68	SVOA	Nitrobenzene	330.00	UG/KG		U	
	68	SVOA	Isophorone	330.00	UG/KG		U	
	68	SVOA	2-Nitrophenol	330.00	UG/KG		U	
	68	SVOA	2,4-Dimethylphenol	330.00	UG/KG		U	
	68	SVOA	Bis(2-Chloroethoxy)methane	330.00	UG/KG		U	
	68	SVOA	2,4-Dichlorophenol	330.00	UG/KG		U	
	68	SVOA	1,2,4-Trichlorobenzene	330.00	UG/KG		U	
	68	SVOA	Naphthalene	330.00	UG/KG		U	
	68	SVOA	4-Chloroaniline	330.00	UG/KG		U	
	68	SVOA	Hexachlorobutadiene	330.00	UG/KG		U	
	68	SVOA	4-Chloro-3-methylphenol	330.00	UG/KG		U	
	68	SVOA	2-Methylnaphthalene	330.00	UG/KG		U	
	68	SVOA	Hexachlorocyclopentadiene	330.00	UG/KG		U	
	68	SVOA	2,4,6-Trichlorophenol	330.00	UG/KG		U	
	68	SVOA	2,4,5-Trichlorophenol	810.00	UG/KG		U	
	68	SVOA	2-Chloronaphthalene	330.00	UG/KG		U	
	68	SVOA	2-Nitroaniline	810.00	UG/KG		U	
	68	SVOA	Dimethyl phthalate	330.00	UG/KG		U	
	68	SVOA	Acenaphthylene	330.00	UG/KG		U	
	68	SVOA	3-Nitroaniline	810.00	UG/KG		U	
	68	SVOA	Acenaphthene	330.00	UG/KG		U	
	68	SVOA	2,4-Dinitrophenol	810.00	UG/KG		U	
	68	VOA	Chloromethane	10.00	UG/KG		U	
	68	VOA	Bromomethane	10.00	UG/KG		U	

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(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	68	VOA	Vinyl chloride	10.00	UG/KG		U	
	68	VOA	Chloroethane	10.00	UG/KG		U	
	68	VOA	Methylenechloride	10.00	UG/KG		U	
	68	VOA	Acetone	19.00	UG/KG		U	
	68	VOA	Carbon disulfide	10.00	UG/KG		U	
	68	VOA	1,1-Dichloroethene	10.00	UG/KG		U	
	68	VOA	1,1-Dichloroethane	10.00	UG/KG		U	
	68	VOA	1,2-Dichloroethene	10.00	UG/KG		U	
	68	VOA	Chloroform	10.00	UG/KG		U	
	68	VOA	1,2-Dichloroethane	10.00	UG/KG		U	
	68	VOA	2-Butanone	10.00	UG/KG		U	
	68	VOA	1,1,1-Trichloroethane	10.00	UG/KG		U	
	68	VOA	Carbon tetrachloride	10.00	UG/KG		U	
	68	VOA	Bromodichloromethane	10.00	UG/KG		U	
	68	VOA	1,2-Dichloropropane	10.00	UG/KG		U	
	68	VOA	cis-1,3-Dichloropropene	10.00	UG/KG		U	
	68	VOA	Trichloroethene	10.00	UG/KG		U	
	68	VOA	Dibromochloromethane	10.00	UG/KG		U	
	68	VOA	1,1,2-Trichloroethane	10.00	UG/KG		U	
	68	VOA	Benzene	10.00	UG/KG		U	
	68	VOA	trans-1,3-Dichloropropene	10.00	UG/KG		U	
	68	VOA	Bromoform	10.00	UG/KG		U	
	68	VOA	4-Methyl-2-pentanone	10.00	UG/KG		U	
	68	VOA	2-Hexanone	10.00	UG/KG		U	
	68	VOA	Tetrachloroethene	10.00	UG/KG		U	
	68	VOA	1,1,2,2-Tetrachloroethane	10.00	UG/KG		U	
	68	VOA	Toluene	10.00	UG/KG		U	
	68	VOA	Chlorobenzene	10.00	UG/KG		U	
	68	VOA	Ethylbenzene	10.00	UG/KG		U	
	68	VOA	Styrene	10.00	UG/KG		U	
	68	VOA	Xylenes (total)	10.00	UG/KG		U	
	68	SVOA	4-Nitrophenol	810.00	UG/KG		U	
	68	SVOA	Dibenzofuran	330.00	UG/KG		U	
	68	SVOA	2,4-Dinitrotoluene	330.00	UG/KG		U	
	68	SVOA	2,6-Dinitrotoluene	330.00	UG/KG		U	
	68	SVOA	Diethylphthalate	330.00	UG/KG		U	
	68	SVOA	4-Chlorophenylphenyl ether	330.00	UG/KG		U	
	68	SVOA	Fluorene	330.00	UG/KG		U	
	68	SVOA	4-Nitroaniline	810.00	UG/KG		U	
	68	SVOA	4,6-Dinitro-o-cresol	810.00	UG/KG		U	
	68	SVOA	N-Nitrosodiphenylamine	330.00	UG/KG		U	
	68	SVOA	4-Bromophenylphenyl ether	330.00	UG/KG		U	
	68	SVOA	Hexachlorobenzene	330.00	UG/KG		U	
	68	SVOA	Pentachlorophenol	810.00	UG/KG		U	
	68	SVOA	Phenanthrene	330.00	UG/KG		U	
	68	SVOA	Anthracene	330.00	UG/KG		U	
	68	SVOA	9H-carbazole	330.00	UG/KG		U	

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12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	68	SVOA	Di-n-butylphthalate	330.00	UG/KG		U	
	68	SVOA	Fluoranthene	330.00	UG/KG		U	
	68	SVOA	Pyrene	330.00	UG/KG		U	
	68	SVOA	Butylbenzylphthalate	39.00	UG/KG		J	
	68	SVOA	3,3'-Dichlorobenzidine	330.00	UG/KG		U	
	68	SVOA	Benzo(a)anthracene	330.00	UG/KG		U	
	68	SVOA	Bis(2-ethylhexyl) phthalate	330.00	UG/KG		U	
	68	SVOA	Chrysene	330.00	UG/KG		U	
	68	SVOA	Di-n-octylphthalate	330.00	UG/KG		U	
	68	SVOA	Benzo(b)fluoranthene	330.00	UG/KG		U	
	68	SVOA	Benzo(k)fluoranthene	330.00	UG/KG		U	
	68	SVOA	Benzo(a)pyrene	330.00	UG/KG		U	
	68	SVOA	Indeno(1,2,3-cd)pyrene	330.00	UG/KG		U	
	68	SVOA	Dibenz[a,h]anthracene	330.00	UG/KG		U	
	68	SVOA	Benzo(ghi)perylene	330.00	UG/KG		U	
67	68	INORG	Aluminum	5630.00	MG/KG			
67	68	INORG	Antimony	3.20	MG/KG		N	UJ
67	68	INORG	Arsenic	1.30	MG/KG			B
67	68	INORG	Barium	66.40	MG/KG			
67	68	INORG	Beryllium	.22	MG/KG			B
67	68	INORG	Cadmium	2.00	MG/KG			
67	68	INORG	Calcium	2930.00	MG/KG			
67	68	INORG	Chromium	8.10	MG/KG			
67	68	INORG	Cobalt	5.20	MG/KG			B
67	68	INORG	Copper	15.40	MG/KG			
67	68	INORG	Iron	11900.00	MG/KG			
67	68	INORG	Lead	2.70	MG/KG			U
67	68	INORG	Magnesium	3390.00	MG/KG			
67	68	INORG	Manganese	300.00	MG/KG			
67	68	INORG	Mercury	.09	MG/KG			U
67	68	INORG	Nickel	8.60	MG/KG			
67	68	INORG	Potassium	1180.00	MG/KG			
67	68	INORG	Selenium	3.00	MG/KG		W	UJ
67	68	INORG	Silver	1.30	MG/KG			B
67	68	INORG	Sodium	311.00	MG/KG			B
67	68	INORG	Thallium	.17	MG/KG			U
67	68	INORG	Vanadium	21.50	MG/KG			
67	68	INORG	Zinc	36.50	MG/KG			
67	68	INORG	Cyanide	.49	MG/KG			U
67	68	RAD	Uranium-233/234	.39	PCI/G	.15		
67	68	ANIONS	Nitrite Nitrate	2.49	mg/Kg			
77	79	RAD	Gross alpha	.02	pCi/g	2.50	R	
77	79	RAD	Gross beta	10.00	pCi/g	4.10	J	
77	79	RAD	Uranium-235	0.00	pCi/g	.04	U	
77	79	RAD	Uranium-238	.45	pCi/g	.16		
77	79	RAD	Plutonium-238	-.01	PCI/G	.02	U	
77	79	RAD	Plutonium-239/40	0.00	pCi/g	.01	U	

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(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
77	79	RAD	Americium-241	.00	pCi/g	.02	U	
77	79	RAD	Carbon-14	5.50	pCi/g	12.00	U	
77	79	RAD	Strontium-90	.21	pCi/g	.93	U	
77	79	RAD	Potassium-40	12.00	pCi/g	.93		
77	79	RAD	Iron-59	.28	pCi/g		U	
77	79	RAD	Chromium-51	1.20	pCi/g		U	
77	79	RAD	Cobalt-60	.04	pCi/g		U	
77	79	RAD	Zinc-65	.13	pCi/g		U	
77	79	RAD	Ruthenium-106	.32	pCi/g		U	
77	79	RAD	Cesium-134	.05	pCi/g		U	
77	79	RAD	Cesium-137	.04	pCi/g		U	
77	79	RAD	Europium-152	.10	pCi/g		U	
77	79	RAD	Europium-154	.06	pCi/g		U	
77	79	RAD	Radium-226	.45	pCi/g	.08		
77	79	RAD	Thorium-228	.73	pCi/g	.06		
77	79	RAD	Thorium-232	.75	pCi/g	.16		
77	79	RAD	Gross alpha	6.80	pCi/g	5.70	R	
77	79	RAD	Gross beta	14.00	pCi/g	4.50	J	
77	79	RAD	Uranium-235	.08	pCi/g	.17	R	
77	79	RAD	Uranium-238	.28	pCi/g	.29	R	
77	79	RAD	Plutonium-238	.00	pCi/g	.02	U	
77	79	RAD	Plutonium-239/40	.00	pCi/g	.01	U	
77	79	RAD	Americium-241	-.01	pCi/g	.01	U	
77	79	RAD	Strontium-90	-.53	pCi/g	.89	U	
77	79	RAD	Carbon-14	-8.60	pCi/g	14.00	U	
77	79	RAD	Potassium-40	12.00	pCi/g	.89		
77	79	RAD	Iron-59	.27	pCi/g		U	
77	79	RAD	Chromium-51	1.10	pCi/g		U	
77	79	RAD	Cobalt-60	.04	pCi/g		U	
77	79	RAD	Zinc-65	.12	pCi/g		U	
77	79	RAD	Ruthenium-106	.37	pCi/g		U	
77	79	RAD	Cesium-134	.05	pCi/g		U	
77	79	RAD	Cesium-137	.05	pCi/g		U	
77	79	RAD	Europium-152	.08	pCi/g		U	
77	79	RAD	Europium-154	.05	pCi/g		U	
77	79	RAD	Radium-226	.50	pCi/g	.08		
77	79	RAD	Thorium-228	.67	pCi/g	.05		
77	79	RAD	Thorium-232	.78	PCI/G	.20		
77	79	ANIONS	Sulfate	32.00	mg/kg			
77	79	ANIONS	Fluoride	2.70	mg/kg			
77	79	ANIONS	Fluoride	3.10	mg/kg			
77	79	ANIONS	Sulfate	33.00	mg/kg			
	79	PEST/PCB	Alpha-BHC	1.90	UG/KG		UJ	
	79	PEST/PCB	Beta-BHC	1.90	UG/KG		U	
	79	PEST/PCB	Delta-BHC	1.90	UG/KG		UJ	
	79	PEST/PCB	Gamma-BHC (Lindane)	1.90	UG/KG		UJ	
	79	PEST/PCB	Heptachlor	1.90	UG/KG		U	

12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	79	PEST/PCB	Aldrin	1.90	UG/KG		UJ	
	79	PEST/PCB	Heptachlor epoxide	1.90	UG/KG		U	
	79	PEST/PCB	Endosulfan I	1.90	UG/KG		U	
	79	PEST/PCB	Dieldrin	3.70	UG/KG		UJ	
	79	PEST/PCB	4,4'-DDE	3.70	UG/KG		UJ	
	79	PEST/PCB	Endrin	3.70	UG/KG		U	
	79	PEST/PCB	Endosulfan II	3.70	UG/KG		U	
	79	PEST/PCB	4,4'-DDD	3.70	UG/KG		UJ	
	79	PEST/PCB	Endosulfan sulfate	3.70	UG/KG		U	
	79	PEST/PCB	4,4'-DDT	3.70	UG/KG		U	
	79	PEST/PCB	Methoxychlor	19.00	UG/KG		U	
	79	PEST/PCB	Endrin ketone	3.70	UG/KG		UJ	
	79	PEST/PCB	Endrin aldehyde	3.70	UG/KG		U	
	79	PEST/PCB	alpha-Chlordane	1.90	UG/KG		U	
	79	PEST/PCB	gamma-Chlordane	1.90	UG/KG		U	
	79	PEST/PCB	Toxaphene	190.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1016	37.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1221	76.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1232	37.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1242	37.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1248	37.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1254	37.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1260	37.00	UG/KG		U	
	79	VOA	Chloromethane	11.00	UG/KG		U	
	79	VOA	Bromomethane	11.00	UG/KG		U	
	79	VOA	Vinyl chloride	11.00	UG/KG		U	
	79	VOA	Chloroethane	11.00	UG/KG		U	
	79	VOA	Methylenechloride	11.00	UG/KG		U	
	79	VOA	Acetone	44.00	UG/KG		U	
	79	PEST/PCB	Alpha-BHC	2.00	UG/KG		UJ	
	79	VOA	Carbon disulfide	11.00	UG/KG		U	
	79	PEST/PCB	Beta-BHC	2.00	UG/KG		U	
	79	VOA	1,1-Dichloroethene	11.00	UG/KG		U	
	79	PEST/PCB	Delta-BHC	2.00	UG/KG		UJ	
	79	VOA	1,1-Dichloroethane	11.00	UG/KG		U	
	79	PEST/PCB	Gamma-BHC (Lindane)	2.00	UG/KG		UJ	
	79	VOA	1,2-Dichloroethene	11.00	UG/KG		U	
	79	PEST/PCB	Heptachlor	2.00	UG/KG		U	
	79	VOA	Chloroform	11.00	UG/KG		U	
	79	PEST/PCB	Aldrin	2.00	UG/KG		UJ	
	79	VOA	1,2-Dichloroethane	11.00	UG/KG		U	
	79	PEST/PCB	Heptachlor epoxide	2.00	UG/KG		U	
	79	VOA	2-Butanone	11.00	UG/KG		U	
	79	PEST/PCB	Endosulfan I	2.00	UG/KG		U	
	79	VOA	1,1,1-Trichloroethane	11.00	UG/KG		U	
	79	PEST/PCB	Dieldrin	3.90	UG/KG		UJ	
	79	VOA	Carbon tetrachloride	11.00	UG/KG		U	

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(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Conc Qual	Flag
	79	PEST/PCB	4,4'-DDE	3.90	UG/KG		UJ	
	79	PEST/PCB	Endrin	3.90	UG/KG		U	
	79	VOA	Bromodichloromethane	11.00	UG/KG		U	
	79	VOA	1,2-Dichloropropane	11.00	UG/KG		U	
	79	PEST/PCB	Endosulfan II	3.90	UG/KG		U	
	79	VOA	cis-1,3-Dichloropropene	11.00	UG/KG		U	
	79	PEST/PCB	4,4'-DDD	3.90	UG/KG		UJ	
	79	VOA	Trichloroethene	11.00	UG/KG		U	
	79	PEST/PCB	Endosulfan sulfate	3.90	UG/KG		U	
	79	VOA	Dibromochloromethane	11.00	UG/KG		U	
	79	PEST/PCB	4,4'-DDT	3.90	UG/KG		U	
	79	VOA	1,1,2-Trichloroethane	11.00	UG/KG		U	
	79	VOA	Benzene	11.00	UG/KG		U	
	79	PEST/PCB	Methoxychlor	20.00	UG/KG		U	
	79	PEST/PCB	Endrin ketone	3.90	UG/KG		UJ	
	79	VOA	trans-1,3-Dichloropropene	11.00	UG/KG		U	
	79	VOA	Bromoform	11.00	UG/KG		U	
	79	PEST/PCB	Endrin aldehyde	3.90	UG/KG		U	
	79	VOA	4-Methyl-2-pentanone	11.00	UG/KG		U	
	79	PEST/PCB	alpha-Chlordane	2.00	UG/KG		U	
	79	PEST/PCB	gamma-Chlordane	2.00	UG/KG		U	
	79	VOA	2-Hexanone	11.00	UG/KG		U	
	79	VOA	Tetrachloroethene	11.00	UG/KG		U	
	79	PEST/PCB	Toxaphene	200.00	UG/KG		U	
	79	VOA	1,1,2,2-Tetrachloroethane	11.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1016	39.00	UG/KG		U	
	79	VOA	Toluene	11.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1221	79.00	UG/KG		U	
	79	VOA	Chlorobenzene	11.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1232	39.00	UG/KG		U	
	79	VOA	Ethylbenzene	11.00	UG/KG		U	
	79	VOA	Styrene	11.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1242	39.00	UG/KG		U	
	79	VOA	Xylenes (total)	11.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1248	39.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1254	39.00	UG/KG		U	
	79	PEST/PCB	Aroclor-1260	39.00	UG/KG		U	
	79	SVOA	Phenol	360.00	UG/KG		U	
	79	SVOA	Bis(2-chloroethyl) ether	360.00	UG/KG		U	
	79	SVOA	2-Chlorophenol	360.00	UG/KG		U	
	79	SVOA	1,3-Dichlorobenzene	360.00	UG/KG		U	
	79	SVOA	1,4-Dichlorobenzene	360.00	UG/KG		U	
	79	SVOA	1,2-Dichlorobenzene	360.00	UG/KG		U	
	79	SVOA	2-Methylphenol	360.00	UG/KG		U	
	79	SVOA	Bis(2-Chloroisopropyl) ether	360.00	UG/KG		U	
	79	SVOA	4-Methylphenol	360.00	UG/KG		U	
	79	SVOA	N-Nitroso-di-n-dipropylamine	360.00	UG/KG		U	

12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	79	SVOA	Hexachloroethane	360.00	UG/KG		U	
	79	SVOA	Nitrobenzene	360.00	UG/KG		U	
	79	SVOA	Isophorone	360.00	UG/KG		U	
	79	SVOA	2-Nitrophenol	360.00	UG/KG		U	
	79	SVOA	2,4-Dimethylphenol	360.00	UG/KG		U	
	79	SVOA	Bis(2-Chloroethoxy)methane	360.00	UG/KG		U	
	79	SVOA	2,4-Dichlorophenol	360.00	UG/KG		U	
	79	SVOA	1,2,4-Trichlorobenzene	360.00	UG/KG		U	
	79	SVOA	Naphthalene	360.00	UG/KG		U	
	79	SVOA	4-Chloroaniline	360.00	UG/KG		U	
	79	VOA	Chloromethane	12.00	UG/KG		U	
	79	VOA	Bromomethane	12.00	UG/KG		U	
	79	SVOA	Hexachlorobutadiene	360.00	UG/KG		U	
	79	VOA	Vinyl chloride	12.00	UG/KG		U	
	79	VOA	Chloroethane	12.00	UG/KG		U	
	79	SVOA	4-Chloro-3-methylphenol	360.00	UG/KG		U	
	79	VOA	Methylenechloride	12.00	UG/KG		U	
	79	SVOA	2-Methylnaphthalene	360.00	UG/KG		U	
	79	VOA	Acetone	41.00	UG/KG		U	
	79	SVOA	Hexachlorocyclopentadiene	360.00	UG/KG		U	
	79	VOA	Carbon disulfide	12.00	UG/KG		U	
	79	SVOA	2,4,6-Trichlorophenol	360.00	UG/KG		U	
	79	VOA	1,1-Dichloroethene	12.00	UG/KG		U	
	79	SVOA	2,4,5-Trichlorophenol	880.00	UG/KG		U	
	79	VOA	1,1-Dichloroethane	12.00	UG/KG		U	
	79	SVOA	2-Chloronaphthalene	360.00	UG/KG		U	
	79	SVOA	2-Nitroaniline	880.00	UG/KG		U	
	79	VOA	1,2-Dichloroethene	12.00	UG/KG		U	
	79	SVOA	Dimethyl phthalate	360.00	UG/KG		U	
	79	VOA	Chloroform	12.00	UG/KG		U	
	79	SVOA	Acenaphthylene	360.00	UG/KG		U	
	79	VOA	1,2-Dichloroethane	12.00	UG/KG		U	
	79	SVOA	3-Nitroaniline	880.00	UG/KG		U	
	79	VOA	2-Butanone	12.00	UG/KG		U	
	79	SVOA	Acenaphthene	360.00	UG/KG		U	
	79	VOA	1,1,1-Trichloroethane	12.00	UG/KG		U	
	79	SVOA	2,4-Dinitrophenol	880.00	UG/KG		U	
	79	VOA	Carbon tetrachloride	12.00	UG/KG		U	
	79	VOA	Bromodichloromethane	12.00	UG/KG		U	
	79	VOA	1,2-Dichloropropane	12.00	UG/KG		U	
	79	VOA	cis-1,3-Dichloropropene	12.00	UG/KG		U	
	79	VOA	Trichloroethene	12.00	UG/KG		U	
	79	VOA	Dibromochloromethane	12.00	UG/KG		U	
	79	VOA	1,1,2-Trichloroethane	12.00	UG/KG		U	
	79	VOA	Benzene	12.00	UG/KG		U	
	79	VOA	trans-1,3-Dichloropropene	12.00	UG/KG		U	
	79	VOA	Bromoform	12.00	UG/KG		U	

12/16/93 Table B-1. Sediment Sample Results for Well 199-K-34.
(HEIS Data)

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	79	VOA	4-Methyl-2-pentanone	12.00	UG/KG		U	
	79	VOA	2-Hexanone	12.00	UG/KG		U	
	79	VOA	Tetrachloroethene	12.00	UG/KG		U	
	79	VOA	1,1,2,2-Tetrachloroethane	12.00	UG/KG		U	
	79	VOA	Toluene	12.00	UG/KG		U	
	79	VOA	Chlorobenzene	12.00	UG/KG		U	
	79	VOA	Ethylbenzene	12.00	UG/KG		U	
	79	VOA	Styrene	12.00	UG/KG		U	
	79	VOA	Xylenes (total)	12.00	UG/KG		U	
	79	SVOA	4-Nitrophenol	880.00	UG/KG		U	
	79	SVOA	Dibenzofuran	360.00	UG/KG		U	
	79	SVOA	2,4-Dinitrotoluene	360.00	UG/KG		U	
	79	SVOA	2,6-Dinitrotoluene	360.00	UG/KG		U	
	79	SVOA	Diethylphthalate	360.00	UG/KG		U	
	79	SVOA	4-Chlorophenylphenyl ether	360.00	UG/KG		U	
	79	SVOA	Fluorene	360.00	UG/KG		U	
	79	SVOA	4-Nitroaniline	880.00	UG/KG		U	
	79	SVOA	4,6-Dinitro-o-cresol	880.00	UG/KG		U	
	79	SVOA	N-Nitrosodiphenylamine	360.00	UG/KG		U	
	79	SVOA	4-Bromophenylphenyl ether	360.00	UG/KG		U	
	79	SVOA	Hexachlorobenzene	360.00	UG/KG		U	
	79	SVOA	Pentachlorophenol	880.00	UG/KG		U	
	79	SVOA	Phenanthrene	360.00	UG/KG		U	
	79	SVOA	Anthracene	360.00	UG/KG		U	
	79	SVOA	9H-carbazole	360.00	UG/KG		U	
	79	SVOA	Di-n-butylphthalate	360.00	UG/KG		U	
	79	SVOA	Fluoranthene	360.00	UG/KG		U	
	79	SVOA	Pyrene	360.00	UG/KG		U	
	79	SVOA	Butylbenzylphthalate	360.00	UG/KG		U	
	79	SVOA	3,3'-Dichlorobenzidine	360.00	UG/KG		U	
	79	SVOA	Benzo(a)anthracene	360.00	UG/KG		U	
	79	SVOA	Bis(2-ethylhexyl) phthalate	62.00	UG/KG		J	
	79	SVOA	Chrysene	360.00	UG/KG		U	
	79	SVOA	Di-n-octylphthalate	360.00	UG/KG		U	
	79	SVOA	Benzo(b)fluoranthene	360.00	UG/KG		U	
	79	SVOA	Benzo(k)fluoranthene	360.00	UG/KG		U	
	79	SVOA	Benzo(a)pyrene	360.00	UG/KG		U	
	79	SVOA	Indeno(1,2,3-cd)pyrene	360.00	UG/KG		U	
	79	SVOA	Dibenz[a,h]anthracene	360.00	UG/KG		U	
	79	SVOA	Benzo(ghi)perylene	360.00	UG/KG		U	
	79	SVOA	Phenol	390.00	UG/KG		U	
	79	SVOA	Bis(2-chloroethyl) ether	390.00	UG/KG		U	
	79	SVOA	2-Chlorophenol	390.00	UG/KG		U	
	79	SVOA	1,3-Dichlorobenzene	390.00	UG/KG		U	
	79	SVOA	1,4-Dichlorobenzene	390.00	UG/KG		U	
	79	SVOA	1,2-Dichlorobenzene	390.00	UG/KG		U	
	79	SVOA	2-Methylphenol	390.00	UG/KG		U	

12/16/93
(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	79	SVOA	Bis(2-Chloroisopropyl) ether	390.00	UG/KG		U	
	79	SVOA	4-Methylphenol	390.00	UG/KG		U	
	79	SVOA	N-Nitroso-di-n-dipropylamine	390.00	UG/KG		U	
	79	SVOA	Hexachloroethane	390.00	UG/KG		U	
	79	SVOA	Nitrobenzene	390.00	UG/KG		U	
	79	SVOA	Isophorone	390.00	UG/KG		U	
	79	SVOA	2-Nitrophenol	390.00	UG/KG		U	
	79	SVOA	2,4-Dimethylphenol	390.00	UG/KG		U	
	79	SVOA	Bis(2-Chloroethoxy)methane	390.00	UG/KG		U	
	79	SVOA	2,4-Dichlorophenol	390.00	UG/KG		U	
	79	SVOA	1,2,4-Trichlorobenzene	390.00	UG/KG		U	
	79	SVOA	Naphthalene	390.00	UG/KG		U	
	79	SVOA	4-Chloroaniline	390.00	UG/KG		U	
	79	SVOA	Hexachlorobutadiene	390.00	UG/KG		U	
	79	SVOA	4-Chloro-3-methylphenol	390.00	UG/KG		U	
	79	SVOA	2-Methylnaphthalene	390.00	UG/KG		U	
	79	SVOA	Hexachlorocyclopentadiene	390.00	UG/KG		U	
	79	SVOA	2,4,6-Trichlorophenol	390.00	UG/KG		U	
	79	SVOA	2,4,5-Trichlorophenol	950.00	UG/KG		U	
	79	SVOA	2-Chloronaphthalene	390.00	UG/KG		U	
	79	SVOA	2-Nitroaniline	950.00	UG/KG		U	
	79	SVOA	Dimethyl phthalate	390.00	UG/KG		U	
	79	SVOA	Acenaphthylene	390.00	UG/KG		U	
	79	SVOA	3-Nitroaniline	950.00	UG/KG		U	
	79	SVOA	Acenaphthene	390.00	UG/KG		U	
	79	SVOA	2,4-Dinitrophenol	950.00	UG/KG		U	
	79	SVOA	4-Nitrophenol	950.00	UG/KG		U	
	79	SVOA	Dibenzofuran	390.00	UG/KG		U	
	79	SVOA	2,4-Dinitrotoluene	390.00	UG/KG		U	
	79	SVOA	2,6-Dinitrotoluene	390.00	UG/KG		U	
	79	SVOA	Diethylphthalate	390.00	UG/KG		U	
	79	SVOA	4-Chlorophenylphenyl ether	390.00	UG/KG		U	
	79	SVOA	Fluorene	390.00	UG/KG		U	
	79	SVOA	4-Nitroaniline	950.00	UG/KG		U	
	79	SVOA	4,6-Dinitro-o-cresol	950.00	UG/KG		U	
	79	SVOA	N-Nitrosodiphenylamine	390.00	UG/KG		U	
	79	SVOA	4-Bromophenylphenyl ether	390.00	UG/KG		U	
	79	SVOA	Hexachlorobenzene	390.00	UG/KG		U	
	79	SVOA	Pentachlorophenol	950.00	UG/KG		U	
	79	SVOA	Phenanthrene	390.00	UG/KG		U	
	79	SVOA	Anthracene	390.00	UG/KG		U	
	79	SVOA	9H-carbazole	390.00	UG/KG		U	
	79	SVOA	Di-n-butylphthalate	390.00	UG/KG		U	
	79	SVOA	Fluoranthene	390.00	UG/KG		U	
	79	SVOA	Pyrene	390.00	UG/KG		U	
	79	SVOA	Butylbenzylphthalate	390.00	UG/KG		U	
	79	SVOA	3,3'-Dichlorobenzidine	390.00	UG/KG		U	

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12/16/93
(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
	79	SVOA	Benzo(a)anthracene	390.00	UG/KG		U	
	79	SVOA	Bis(2-ethylhexyl) phthalate	390.00	UG/KG		U	
	79	SVOA	Chrysene	390.00	UG/KG		U	
	79	SVOA	Di-n-octylphthalate	390.00	UG/KG		U	
	79	SVOA	Benzo(b)fluoranthene	390.00	UG/KG		U	
	79	SVOA	Benzo(k)fluoranthene	390.00	UG/KG		U	
	79	SVOA	Benzo(a)pyrene	390.00	UG/KG		U	
	79	SVOA	Indeno(1,2,3-cd)pyrene	390.00	UG/KG		U	
	79	SVOA	Dibenz[a,h]anthracene	390.00	UG/KG		U	
	79	SVOA	Benzo(ghi)perylene	390.00	UG/KG		U	
77	79	INORG	Aluminum	4950.00	MG/KG			
77	79	INORG	Antimony	3.40	MG/KG		N	UJ
77	79	INORG	Arsenic	1.50	MG/KG		W	J
77	79	INORG	Barium	42.20	MG/KG			
77	79	INORG	Beryllium	.26	MG/KG			B
77	79	INORG	Cadmium	.29	MG/KG			U
77	79	INORG	Calcium	6730.00	MG/KG			
77	79	INORG	Chromium	10.50	MG/KG			
77	79	INORG	Cobalt	6.10	MG/KG			B
77	79	INORG	Copper	19.40	MG/KG			
77	79	INORG	Iron	11200.00	MG/KG			
77	79	INORG	Lead	3.10	MG/KG			U
77	79	INORG	Magnesium	3820.00	MG/KG			
77	79	INORG	Manganese	215.00	MG/KG			
77	79	INORG	Mercury	.10	MG/KG			U
77	79	INORG	Nickel	12.40	MG/KG			
77	79	INORG	Potassium	774.00	MG/KG			B
77	79	INORG	Selenium	3.20	MG/KG		W	UJ
77	79	INORG	Silver	1.20	MG/KG			B
77	79	INORG	Sodium	142.00	MG/KG			B
77	79	INORG	Thallium	.18	MG/KG			U
77	79	INORG	Vanadium	21.60	MG/KG			
77	79	INORG	Zinc	30.00	MG/KG			
77	79	INORG	Cyanide	.56	MG/KG			U
77	79	INORG	Aluminum	4480.00	MG/KG			
77	79	INORG	Antimony	4.30	MG/KG		N	UJ
77	79	INORG	Arsenic	1.40	MG/KG			B
77	79	INORG	Barium	46.50	MG/KG			
77	79	INORG	Beryllium	.30	MG/KG			B
77	79	INORG	Cadmium	.30	MG/KG			U
77	79	INORG	Calcium	5980.00	MG/KG			
77	79	INORG	Chromium	13.00	MG/KG			
77	79	INORG	Cobalt	5.80	MG/KG			B
77	79	INORG	Copper	12.40	MG/KG			
77	79	INORG	Iron	12300.00	MG/KG			
77	79	INORG	Lead	3.70	MG/KG			U
77	79	INORG	Magnesium	3140.00	MG/KG			

12/16/93
(HEIS Data)

Table B-1. Sediment Sample Results for Well 199-K-34.

Interval: Top	Bot	Analysis Group	Constituent	Result	Units	Error	Qual	Conc Flag
77	79	INORG	Manganese	203.00	MG/KG			
77	79	INORG	Mercury	.09	MG/KG			U
77	79	INORG	Nickel	10.40	MG/KG			
77	79	INORG	Potassium	687.00	MG/KG			B
77	79	INORG	Selenium	3.40	MG/KG		W	UJ
77	79	INORG	Silver	1.40	MG/KG			B
77	79	INORG	Sodium	172.00	MG/KG			B
77	79	INORG	Thallium	.20	MG/KG			U
77	79	INORG	Vanadium	23.40	MG/KG			
77	79	INORG	Zinc	28.60	MG/KG			
77	79	INORG	Cyanide	.53	MG/KG			U
77	79	RAD	Uranium-233/234	.59	PCI/G	.19		
77	79	RAD	Uranium-233/234	.42	PCI/G	.43	R	
77	79	ANIONS	Nitrite Nitrate	2.56	mg/Kg		U	
77	79	ANIONS	Nitrite Nitrate	2.31	mg/Kg		U	

Note: "Interval" refers to the depth from the ground surface to the top and bottom of the sampled interval, measured in feet.

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